SEPTEMBER 2003

CITY OF CLEARWATER
PINELLAS COUNTY, FLORIDA

STEVENSON CREEK ESTUARY

FINAL DRAFT
ECOSYSTEM RESTORATION REPORT and
ENVIRONMENTAL ASSESSMENT

SECTION 206
AQUATIC ECOSYSTEM RESTORATION

US Army Corps of Engineers
Jacksonville District
South Atlantic Division

EXECUTIVE SUMMARY

This Ecosystem Restoration Report provides the results of a feasibility level study conducted under the authority of Section 206 of the 1996 Water Resources Development Act (WRDA) as amended, to environmentally restore portions of Stevenson Creek. Section 206 authorizes the Corps of Engineers to carry out an aquatic ecosystem restoration and protection project if determined that the project: (1) will improve the quality of the environment and is in the public interest, and (2) is cost-effective. The objective should be to restore a degraded ecosystem to a more natural condition, which will involve consideration of the ecosystem's natural integrity, productivity, stability and biological diversity. The primary benefits from projects must be associated with improvements to fish and wildlife resources.

Stevenson Creek is a 39.0 acre tidal estuary located in central Pinellas County on the Gulf Coast of Florida. The creek originates in the City of Clearwater and flows for about three miles where it discharges into the Intracoastal Waterway and Clearwater Harbor. Clearwater Harbor is designated by the state of Florida as an Outstanding Florida Water and part of the Pinellas County Aquatic Preserve. The creek drains a watershed area of approximately 6300 acres, 95% of which is developed. The specific reach of the river considered for this project is located between N. Fort Harrison Ave. and Pinellas Trail (Reach 1) and between Pinellas Trail and Douglas Ave. (Reach 2). Ecosystem restoration would occur at two sites along Stevenson Creek between N. Fort Harrison Ave. and Douglas Ave. Muck removal would occur within Reach 1 from bank to bank to a depth of –5.5 NGVD. Muck removal would occur within Reach 2 from bank to bank to a depth of –4.5 NGVD. Within Reach 1, two mangrove shelves totaling 3.2 acres, would be created and planted with Red Mangrove (Rhizophora germinans) and/or Black Mangrove (Rhizophora mangle). Additionally, 1.0 acre of invasive (nuisance and exotic) species from the areas immediately adjacent to the North Fort Harrison Bridge, Pinellas Trail Bridge and Douglas Avenue bridge shorelines will be removed.

The environmental benefits consist of restoring approximately 27.92 aquatic habitat units. Dredging proposed for the estuary would remove a concentrated deposit of sediments, primarily muck. Restorative waterway benefits would be realized immediately in terms of increase velocity and circulation. Such actions would improve fish and wildlife values, in addition to, providing improvements in water quality, recreational public interest values, and general navigation. The project would also create manatee habitat and remove offensive odors. The total project cost is estimated at $7,360,987.

The estuary portion of the creek is designated within a Brownfield's and Environmental Justice Site.

STEVENSON CREEK AQUATIC ECOSYSTEM RESTORATION
CITY OF CLEARWATER
PINELLAS COUNTY, FLORIDA

SECTION 206 ECOSYSTEM RESTORATION REPORT

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STEVENSON CREEK AQUATIC ECOSYSTEM RESTORATION
CITY OF CLEARWATER, PINELLAS COUNTY, FLORIDA

1 STUDY AUTHORITY

This document is an Environmental Restoration Report (ERR) submitted under the authority of Section 206 of the Water Resources Development Act (WRDA) of 1996 (PL 104-303), as amended. The act reads, in part, as follows:

> "...The Secretary may carry out an aquatic ecosystem restoration and protection project if the Secretary determines that the project - (1) will improve the quality of the environment and is in the public interest; and (2) is cost-effective."

2 STUDY PURPOSE AND SCOPE

The purpose of this study is to develop a plan for the aquatic ecosystem restoration of Stevenson Creek. This ERR follows the guidelines of EP 1165-2-502, Ecosystem Restoration – Supporting Policy Information, and ER 1105-2-100, Planning Guidance Notebook, dated 22 April 2000.

The overall goal is to restore the existing system to a less degraded state. The alternatives analyzed for Stevenson Creek concentrated on removing accumulated sediments and muck, restoring inter-tidal and sub-tidal benthic substrate, removing exotic vegetation and the planting of native vegetation. Alternatives were also crafted to attempt to restore hydrologic processes in Stevenson Creek that were disrupted by urban development. Restoration of these hydrologic processes is expected to allow the system to prevent re-accumulation of sediments.

This ERR is the follow-up to the approved Preliminary Restoration Report prepared in October of 2000 which recommended removal of 80,000 cubic yards of muck within the estuary (main downstream portion of the creek), removal of 10,000 cubic yards of accumulated sediment and muck immediately seaward of the most downstream bridge in order to improve tidal flow, removal of one acre of exotic vegetation and the planting of ten acres of native vegetation including seagrasses. Construction costs were estimated at $3,512,000 and assumed the use of adjacent 10 acre temporary dewatering and staging site and final disposal at a closed public landfill.

PROJECT PARTNERS

The U.S. Army Corps of Engineers, Jacksonville District had the primary responsibility of preparing this document. The local sponsor, the City of Clearwater, Florida was instrumental in providing information for this document. The U.S. Fish and Wildlife Service (USFWS) furnished the Fish and Wildlife Coordination Act Report, which was used to prepare the Environmental Assessment. The Southwest Florida Water Management District (SWFWMD) and the Florida Department of Environmental Protection (FDEP) have provided input on existing resources.

There has been for some time, a strong ongoing effort on the part of the City of Clearwater, including area residents, to restore Stevenson Creek. The city has devised a master plan and begun constructing stormwater attenuation facilities. They are also in the process of acquiring the

necessary real estate to accomplish future stormwater diversion and attenuation construction projects. Ten years ago the wastewater treatment facility was upgraded to include treatment that effectively eliminated a point source of pollution. The City also actively sought and received a designation for this segment of the creek as a Brownfield's area. This has allowed the city to receive some funds to pursue, among other things, the purchase of an existing five-acre junkyard site adjacent to the creek. The City used these funds to conduct HTRW tests of the junkyard and is in the process of negotiating with the landowner. A recent purchase is a four-acre parcel that is half uplands and half an endangered wetlands site unique to this highly urbanized watershed. Known as the Wolfe property, it is adjacent to the creek and offers an opportunity to this project for use as a temporary dewatering and staging area. By careful clearing, undesirable plant species including some exotics can be permanently removed and later replaced with native vegetation. All the efforts being conducted by non-Federal agencies will only compliment the Corps restoration initiatives.

BROWNFIELDS INITIATIVES

The City of Clearwater has been actively pursuing restoration of the Stevenson Creek estuary and adjacent property for several years. The estuary portion of the creek is within a designated Brownfield's site. EPA Brownfield's Economic Redevelopment initiative is designed to empower states, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse Brownfield's. A Brownfield is a site, or portion thereof, that has actual or perceived contamination and an active potential for redevelopment or reuse. EPA is funding: assessment demonstration pilot programs (each funded up to $200,000 over two years), to assess Brownfield's sites and to test cleanup and redevelopment models; job training pilot programs (each funded up to $200,000 over two years), to provide training for residents of communities affected by Brownfield's to facilitate cleanup of Brownfield sites and prepare trainees for future employment in the environmental field; and cleanup revolving loan funds to make loans for the environmental cleanup of Brownfield's. These pilot programs are intended to provide EPA, states, tribes, municipalities, and communities with useful information and strategies as they continue to seek new methods to promote a unified approach to site assessment, environmental cleanup, and redevelopment.

ENVIRONMENTAL JUSTICE

The City of Clearwater has suffered from private sector disinvestments combined with environmental decline. The past decade, in particular, has been characterized by both business and job losses. These economic changes have hit central Clearwater's North and South Greenwood neighborhoods hardest. As part of Clearwater Brownfield's Area (CBA), which covers 1,842 acres, the Brownfield's Cleanup Revolving Loan Fund (BCRLF) will target cleanup and revitalization of North and South Greenwood communities and portions of the downtown business district. In this area, nearly 26 percent of the residents live below the poverty level and almost 10 percent are unemployed. There are approximately 200 potentially contaminated sites in the CBA, and the area is a State-designated Enterprise Zone, a Neighborhood Revitalization Strategy Area, A Brownfield's Assessment Pilot, a State-designated Brownfield's area, and a U.S. Department of Justice Weed and Seed site. Five hundred thousand dollars have been committed to this effort. The sponsor intends to provide a learning experience to local school children at the Stevenson Creek site once restored.

3 LOCATION

Stevenson Creek is a tidally influenced stream in central Pinellas County on the Gulf Coast of Florida (Figure 1). The creek originates in the City of Clearwater and flows in a northwest direction for about three miles to eventually discharge into the Intracoastal Waterway and Clearwater Harbor. Within the estuarine area, the Spring Branch tributary also provides flow to the creek. As a receiving point for creek waters, Clearwater Harbor is connected on its immediate north to St. Joseph Sound. Clearwater Harbor has been designated by the state of Florida as an Outstanding Florida Water and part of the Pinellas County Aquatic Preserve. The creek drains a watershed area of approximately 6300 acres, 95% of which is developed.

Figure 1
Location map

PLATE	STEVENSON CREEK - CLEARWATER, FLORIDA ENGINEERING APPENDIX	File name: Reference files:	Designed by: R.E.H. Dwn by: R.E.H. Ckd by: Dated:	Scale: AS SHOWN Plot date: JUNE 13, 2002 Plot scale:	DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	US Army Corps of Engineers Jacksonville District

4 PRIOR STUDIES AND REPORTS

Following are some of the more recent studies undertaken:

a. Stevenson Creek Watershed Management Plan prepared by the Parsons Engineering Science Inc. in August of 2001.
b. Sediment and Water Quality Study for Stevenson Creek, City of Clearwater, Targeted Brownfields Assessment Project dated July of 2001.
c. Preliminary Restoration Report (PRP) for Stevenson Creek prepared by the Jacksonville District, U.S. Army Corps of Engineers in October of 2000.
d. Environmental Data Report, Approximate ¼ mile radius of Clearwater Brownfields Area prepared by Environmental Data Management, Inc., in February of 1999.
e. Stevenson Creek Sampling, City of Clearwater Sediment Characterization and Removal Feasibility Study prepared by BCI Engineers and Scientists, Inc., August of 1998.
f. City of Clearwater State Brownfields Redevelopment Work Plan, dated October of 1997.

5 PLAN FORMULATION

5.1 Historic and Existing Conditions

GENERAL
Stevenson Creek is a tidal creek in Clearwater, Pinellas County, Florida. The creek stretches from approximately Betty Lane on the east to North Fort Harrison Avenue bridge (Alternate 19) on the west. The entire creek comprises an area of approximately 39 acres and is located in one of the more developed regions of Florida. This report focuses on approximately 29-acres of the creek between North Fort Harrison Avenue and Douglas Avenue bridges.

Development pressures began during World War II, with a heavy concentration of the estuary being filled from 1945 to 1954. Channelization and side casting of dredged material have also altered and eliminated historic flood plains. The dredged material was used to fill areas of the estuary for residential properties. This action resulted in a 70-80 % reduction in the width of the mouth of the estuary. Today, the estuary comprises less than one half of the original area and surrounding land is more than 90 percent developed.

Stevenson Creek is the largest and most urbanized watershed in the City of Clearwater, draining 6,286 acres in western Pinellas County. About 65 % of the watershed is within the city limits of Clearwater, 20 percent within the City of Dunedin, 14 within unincorporated Pinellas County, and 1 percent in the City of Largo.

An earlier report (Joyner, 1987) indicated that residential land use accounts for 64% of the total acreage resulting in a significant non-point source of nutrient loading, primarily total phosphorus, to the creek. The Marshall Street Advanced Water Treatment facility, adjacent to the south shoreline of the creek, discharges into the creek east of the Douglas Avenue Bridge. This facility was considered a major source of nutrients until 1992, when it was upgraded to an Advanced Wastewater Treatment facility. The shoreline consists of numerous outfall structures that convey

storm water drainage from the area into the creek. Heavy vegetation comprises the shoreline with numerous patches of Brazilian Pepper.

Before developmental pressures, Stevenson Creek was a productive estuary with good water quality and provided a vital nursery for estuarine, offshore fish species and shellfish. Today, the impacts of growth have threatened the creek's beauty and productivity. Poor water quality, a historic lack of best management practices, and decreased circulation created by 4 bridges, have caused the creek to fill with detritus and muck resulting in a decrease of fish and wildlife productivity. Specific problems include nutrient loading and bacterial contamination from leaking septic systems, and elevated levels of pollutants and sediments entering the estuary directly from stormwater discharges, or indirectly through open drainage ditches/canals.

ENVIRONMENTAL SETTING

The Stevenson Creek project area of interest includes approximately 29 acres of water surface area (between North Fort Harrison Avenue Bridge and the Douglas Avenue Bridge) that is the drainage basin for three entire watersheds and part of a fourth (see Figure 1). Stevenson Creek runs through a golf course, has an advanced wastewater treatment facility (Marshall Street Plant) discharging into it, and is the primary collector for many city and county road storm drains. Numerous outfall structures that convey storm water into the creek can be seen along the shoreline. It is reported that many homes in the area have septic systems that have a potential to seep into the creek, though none are documented. While no major stands of exotic vegetation were noted, torpedo grass (Panicum repens), cattails (Typha spp.) and Brazilian pepper (Schinus terebinthifolius) were noted. The study area can be classified as an urbanized, Gulf coast saltwater estuarine system. (Stevenson Creek Sediment and Water Quality Study, July 2001)

Lowered water quality in the creek has always been attributed to urban storm water runoff and past discharges from the wastewater treatment plant. Dissolved oxygen reductions were probably caused by excessive nutrient loading as indicated by past Total Kjeldahl Nitrogen (TKN) violations of the treatment plant permit. Historical evaluation of the quality of the sediments in the estuary showed presence of anthropogenic chemicals, clearly from non-point runoff from upstream. Contaminants such as pesticides and PCB's trace metals such as lead, copper, silver and zinc, and polycyclic aromatic hydrocarbons were detected at elevated levels over the years but did not exceed Toxicity Characteristics Leaching Procedures (TCLP) maximum limits within the Resource Conservation And Recovery Act (RCRA) program. In the mid 1990's the wastewater treatment plant instituted advanced waste treatment technology and is currently not in violation of any National Pollution Discharge Elimination System point source permit requirement. It is now believed that the poor water quality is caused by the accumulated muck that acts as a source of trace metal and organic contamination when mixed. (Stevenson Creek Sediment and Water Quality Study, July 2001).

The Stevenson Creek area is home to a wide array of fish and wildlife. Fish within Stevenson Creek include salt water species as well as brackish and fresh water species. Several crustaceans and mollusks, including but not limited to blue crabs, fiddler crabs, oysters and conchs, also inhabit the estuary. Several threatened (T) and endangered (E) species are known to use Stevenson Creek. A pair of adult bald eagles (*Haliaeetus leucocephalus*) and at least one juvenile has been sighted flying over the estuary and wood storks (*Mycteria americana*) use the estuary for foraging activities. However, no nests of either species have been reported within or directly adjacent to the

project boundaries. Stevenson Creek lies within the habitat range of the West Indian Manatee (*Trichechus manatus*). Stevenson Creek may be too shallow for manatees to enter at this time. There are no seagrass beds currently within Stevenson Creek's boundaries, which makes it poor foraging habitat for manatee. Piping Plover (*Charadrius melodus*) (T), Green Sea Turtle (*Chelonia mydas*) (E), Leatherback Sea Turtle (*Dermochelys coriacea*) (E), Loggerhead Sea Turtle (*Caretta caretta*) (T), and the Gulf Sturgeon (*Acipenser oxyrhynchus desotoi*) (T) may inhabit the project area. Other threatened and endangered species that may inhabit the area include the brown pelican (*Pelecanus occidentalis*), coontie (*Amia integretolia*) and cereus (*Cereus eriphorus*).

CAUSEWAYS

The portion of Stevenson Creek that is the focus of this study is intersected by three separate bridges (Figure 1), all of which have causeways. In order, traveling upstream, these are the North Fort Harrison Avenue Bridge, the Pinellas Trail Bridge and the Douglas Avenue Bridge. All the bridges are concrete and all constrict the flow-way to various degrees. The North Fort Harrison Avenue Bridge (Alternate U.S. Highway 19) was by the early 1900's a wooden bridge where the estuary joins Clearwater Harbor. This was replaced with an earthen causeway. Between World War II and 1968, filling occurred along the southern banks of the estuary on each side of the causeway. Forty percent of the opening is constricted as a result. The Pinellas Trail bridge was formerly a railroad spur line built in the 1800s for transporting orange crop. That old spur line has since been converted to a bicycle and pedestrian trail and is a part of the Pinellas Trail. Also following World War II, filling occurred at the southeastern point of the old railroad spur line. The causeway has reduced the width of the creek by 33%. Finally, a new bridge near the eastern-most point of the estuary basin was built. This new bridge is known as the Douglas Avenue Bridge and it constricts the flow way by close to 50%. These causeways contribute to poor circulation within the estuary system and worsen water quality. They cause sediments to accumulate at a faster rate than if they were not present

The causeways and shoreline properties are vegetated by cabbage palms (*Sabal palmetto*), wax myrtle (*Myrica cerifera*), Brazilian peppers (*Schinus terebinthifolius*), red mangrove(*Rhizophora mangle*) and black mangrove (*Avicennia germinans*). The southern border near the Pinellas Trail has a small stand of Australian pine (*Casuarina equisetifolia*). The transitions between marsh and hardwood upland communities continue to occur in the eastern direction until the estuary gives way to a creek-like system and intersects with a paved road and developed land.

LAND USE

Stevenson Creek's boundaries have experienced intense urban development over the last 50 years. Private property on both banks of the creek in the estuarine area is characterized by medium density residential development. Upstream of the estuary basin, increasing levels of urbanization have occurred to the point where close to 95% of the entire watershed is built-out. Most of the upstream area was developed before 1980 with minimal stormwater treatment and is currently served by an advanced wastewater treatment plant on the creek near the estuary. Within the project area this is the only non-residential structure adjacent to the creek. Having been built in the decade following World War II, the wastewater treatment plant had implemented advanced wastewater treatment commencing in 1992.

WATER QUALITY

Area waters are listed by the State of Florida as Class III Recreational. Stevenson Creek is also included on Florida's list of impaired waters (303(d) List) due to concerns over dissolved oxygen, coliforms, and nutrients (Parson 2001). Water depths range from 1.5 to 3 feet within the restoration area. The sedimentation on Stevenson Creek has been so extreme, that at low tide, some areas are completely exposed to the atmosphere (see cover photo). The eastern end of Stevenson Creek is connected to the Stevenson Creek and Spring Branch Watersheds, the Spring Branch Watershed including lands outside the City limits but within Pinellas County.

Stevenson Creek receives most of its fresh water from the middle and upper reaches of the creek. Stevenson Creek receives a smaller amount of freshwater from Spring Branch, which flows generally southwest to enter the easternmost end of the estuary. The Spring Branch flows southwest near the intersection of Kings Highway and Union Street and enters the estuary between the Pinellas Trail Causeway and the Douglas Avenue Bridge.

The increase of urban development in the past has also contributed to the increase of stormwater runoff. Stormwater runoff carries nutrients (such as fertilizers), roadway sediments (such as dirt, asphalt pieces, grease and other chemicals) and other pollutants in the estuary from throughout the watershed. Stormwater enters Stevenson Creek directly from storm drains and channels as well as indirectly via Spring Branch. Starting in about 1989, the City began implementing a number of stormwater capital improvement projects upstream of the estuary and there are many more planned for the whole

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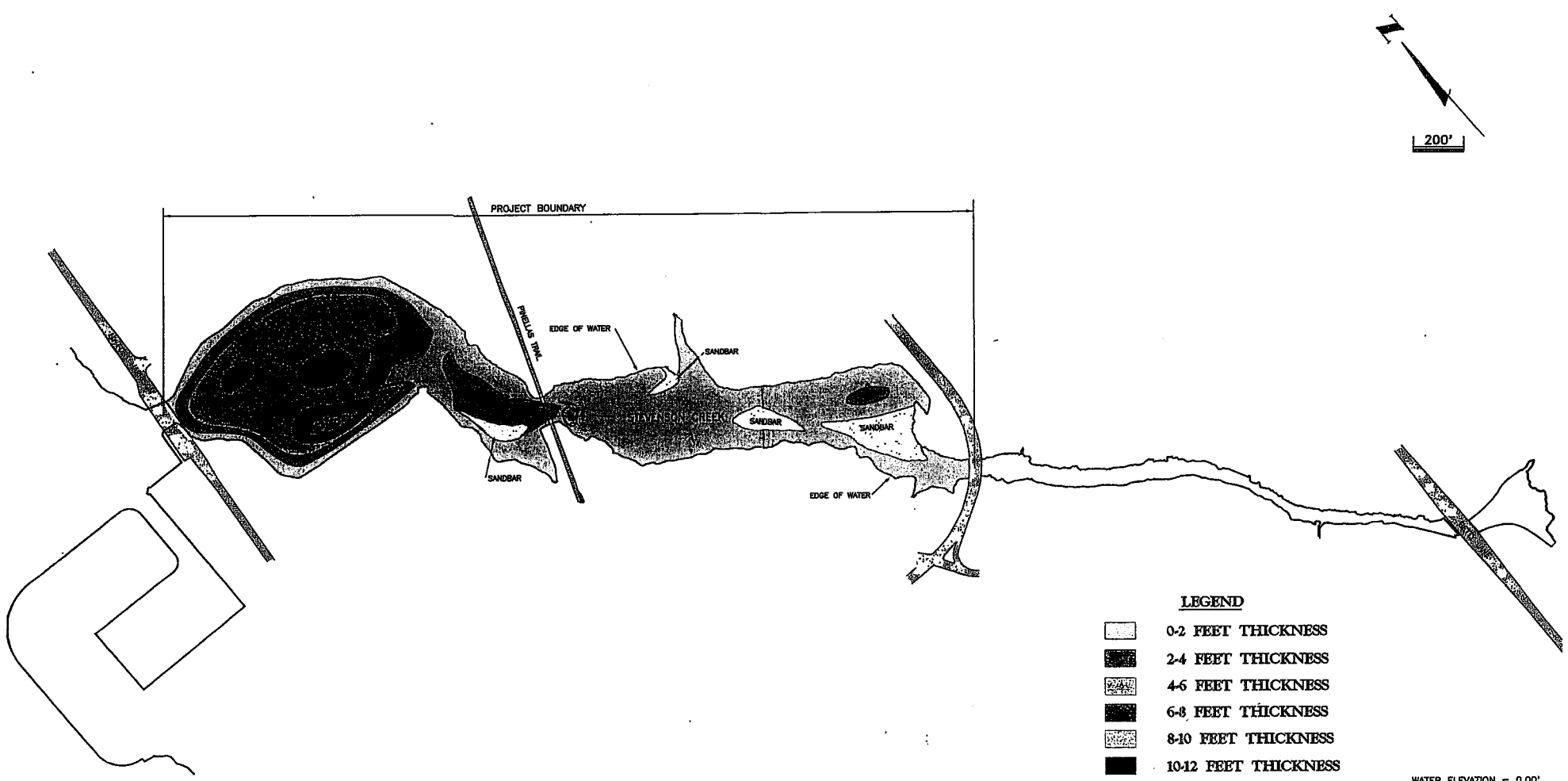


REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
8-18-98	LEY	ADDED MUCK BY SANDBAR PER CLIENT						

BCI
ENGINEERS & SCIENTISTS, INC.
2000 E. EDGEWOOD DRIVE, LAKELAND, FL 33803
PHONE: (941) 667-2345

	NAME	DATE		NAME	DATE
DESIGNED BY		2-98	DRAWN BY	LEY	2-98
CHECKED BY	MLC	2-98	CHECKED BY	SKP	2-98

SUPERVISED BY: SHAILESH K. PATEL

STEVENSON CREEK

APPROVED BY: DATE:

BCI NO.:

FIGURE 2
ORGANIC SEDIMENT THICKNESS

length of the creek and its tributaries. The Spring Branch Conveyance Enhancements and Flood Detention Basin are two projects, which the City is currently pursuing. These two projects combined, will remove 27 structures from the 100-year floodplain, provide treatment and attenuate the runoff in this area of the watershed. Negotiations for the property needed for this project is underway. The estimated project cost is $4,157,360 and the estimated construction start date is 4/30/05 and is to be completed within 9 months from the contract award date. Upon implementation of the above projects it is projected that sedimentation from upstream will be substantially reduced or eliminated.

MUCK CHARACTERIZATION

The muck in Stevenson Creek is made up of organic material, inorganic silts and very fine sands. Twelve core samples of depth and composition of the sediments from several locations of Stevenson Creek yielded 1.5 to 4.5 feet of muck. The City of Clearwater hired consultants who sampled sediments in several locations of Stevenson Creek, and measured 0 to 8 feet of muck (Figure 2). The natural hard bottom, below the mucky sediments, is defined in Appendix A as material that offers much more resistance than muck to the core boring equipment used for this study. This hard bottom is primarily sand with little or no fines, sands with some silty material, or inorganic clays. They are classified SP, SM, and CL in the Unified Soil Classification System. For Stevenson Creek, the term hard bottom does not refer to rock type outcrops.

The general public has complained to the City of odors emanating from exposed sediment. Homes were built in the area near both banks of Stevenson Creek in the 1950s and 1960s. These homes were built with septic tanks. Wastewater leaking from these residential septic systems seeps into the estuary. Additionally, a wastewater treatment plant located immediately upstream of the Douglas Avenue Bridge has been directly discharging into the creek without adequate tertiary treatment until 1992 at which time the plant was retrofitted with additional treatment capability.

DREDGING/DISPOSAL METHOD

Temporary Dewatering Site: There was only one other smaller parcel of land that could have been used for this purpose and that was adjacent to the creek. Three residential parcels are on the market immediately upstream of the Pinellas Trail Bridge. The total acreage is only one and a half acres and there are some mangroves by the waters edge. This is smaller than the Wolfe property site; to combine use of both sites was determined to be not feasible. There would have been added mob and demob costs for the dredge and all the assorted processing equipment needed to process the dredged material for permanent disposal. A plan to efficiently handle the dredged material, dry it and take it to final disposal was needed. It was determined that a material density separator (hydrocyclone) as proposed in the PRP would be justified to remove the high percentage of sand that is mixed within the muck (42%) and since the sand has useful, marketable properties the portion not used to create the mangrove ledge could be marketed or stockpiled at the disposal site where willing takers could remove it. This reduces the amount that would require permanent disposal alleviating that problem somewhat. The remaining muck would then be placed into the geobags for dewatering. It is expected that there would be enough room to maintain a small dredge operational with minimum shut down time. After dewatering, the geobags (sized to fit into large dump trucks) would be loaded and taken to permanent disposal. There they would be opened and the material spread out evenly.

During the study of dredging/disposal options, the sponsor offered the use of a very large city owned property, only slightly further away in distance than the site proposed in the PRP. It is a former sludge farm that was last used in 1992 by the city. The site totals 400 acres of which half is wetlands and the other half has approximately one foot of sludge, now overgrown with pasture. The property is in another county, Hillsborough and is currently leased by the city to a private individual who is allowed grazing rights in exchange for limited maintenance and oversight. Two historical sites found were determined not to be significant and since only 25 acres is required (allows for a two foot dike/disposal height), the site seems ideal for the project. Travel distance is 21 miles in one direction and is mostly highway. The one drawback stems from considerable development occurring in route to the site along what could once be considered rural paved roads. Well over 2,000 dump truck deliveries are anticipated (over several months).

5.2 Future Without Project Conditions

WATER QUALITY

Without the implementation of this project, water quality within the project area will likely continue to decline, although at a slower rate than it has in the last 30-40 years. This is because little new clearing or construction is likely to occur in the watershed, and because additional hydrologic, hydraulic and pollution control improvements are scheduled for most of the Stevenson Creek watershed. The older residential developments typically had no stormwater treatment improvements and used drainage canals to discharge their runoff directly into Stevenson Creek. The City continues to acquire properties to be used for stormwater retention areas, which will detain and treat stormwater before it enters Stevenson Creek. These stormwater treatments will greatly improve the quality of the water entering the creek. This water will have much less sediment, road debris, nutrients, and bacteria.

In the early 1990's improvements were made to the existing wastewater treatment facility such that discharges into the creek from the plant now meet environmental criteria. However, this plant had discharged for many years, pollutants that have contaminated the muck being deposited. The material is considered to be anthropogenically contaminated with metals above what would be considered clean in natural unaffected sediments. Concentrations of chemicals detected however, are below the threshold, which would be classified as hazardous and toxic wastes. Please see table EA-8 on sediment testing results. These pollutants have resulted in the strong foul odor at low tide that has many residents clamoring for removal. Another existing source of pollution are the unapproved septic tanks that have been a source of nutrients and fecal coliforms entering Stevenson Creek. The replacement of septic systems with central sanitary sewer systems is a city priority and is included in the Without Project condition. Both the wastewater treatment plant effluent and the septic tank discharges are not considered problems to be addressed by this project.

Continued improvements to runoff quantity and quality are therefore included in the Without Project conditions, however, while these actions are necessary to restore the ecosystem, they are not in and of themselves sufficient to achieve full restoration.

FISH, WILDLIFE AND HABITAT RESOURCES

Without this project the habitat within the project area will continue to deviate from its original condition as a well-flushed estuarine creek. Additional sedimentation will result in further decreases in water depth that might allow development of vegetation within the creek channel. In fact, mangrove seedlings have already been observed in the middle of the channel. And although vegetation encroachment may not necessarily be detrimental for certain species, the structure and function of the estuary will change considerably. The existing, already damaging deposition of silt may increase and spread to a point where what was once a thriving Gulf Coast estuarine ecosystem may actually morph into a tidal marsh.

Stevenson Creek will still contain the sediments that have accumulated over the past 50 or more years. These sediments will continue to contribute to poor water clarity, high nutrient concentrations, and high bacteria counts. They will still cover the hard substrates that supported submerged aquatic vegetation that is required by oysters and used by a wide variety of fish. They will still occupy such a large proportion of volume of the estuary that the water depth is still too shallow for large sport fishes, much less manatees and porpoises, to enter.

EXOTIC SPECIES

Without maintenance-control of exotic species such as Brazilian pepper and Australian pine, native vegetation would likely continue to decline relative to these more invasive species. Species that depend exclusively on native vegetation for food, refuge, or roosting would decline as well.

STEVENSON CREEK WATERSHED MANAGEMENT PLAN

The Stevenson Creek Watershed Management Plan was developed through a Cooperative Agreement between the Southwest Florida Water Management District and the City of Clearwater. The primary objective was to develop a comprehensive Watershed Management Plan for the Stevenson creek basin, which encompasses approximately 6000 acres in central Pinellas County. The management plan will be used as a tool in the planning, regulation and management of natural resources, of future development and as a basis for determining and prioritizing capital improvements.

The implementation of the Stevenson Creek Watershed Management Plan is of significant importance to the U.S. Army Corps of Engineer's Aquatic Ecosystem Restoration Project. Implementation of the following City projects will contribute to the goal of the Corps project. The purpose of the Corps ecosystem restoration activities is to restore significant ecosystem function, structure, and dynamic processes that have been degraded. Ecosystem restoration efforts will involve a comprehensive examination of the problems contributing to the system degradation, and the development of alternative means for their solution. The intent of the restoration is to partially or fully reestablish the attributes of a naturalistic, functioning, and self-regulating system.

The Stevenson Creek Watershed Management Plan is complete and the City of Clearwater is preparing to begin implementing the projects identified in the Plan. During the development of the Stevenson Creek Watershed Management Plan, the City of Clearwater focused the prioritization of the projects on the Cost-Benefit of the projects. The City realized there were many other variables such as private property acquisition, negotiating utilization of the Parks Departments lands, existing leases on City properties and public acceptance of the projects. A combination of the project

rankings in the WMP and many other variables will be utilized to implement projects identified in the plan.

The City of Clearwater is proceeding with the implementation of four projects that are identified in the Stevenson Creek Watershed Management Plan. The project descriptions and status are as follows:

1. Palmetto Street Improvements
Description: This project consists of approximately 1,900' of 54" RCP along Palmetto Street, between Highland Avenue and Betty Lane, to divert treated storm water from the Highland Avenue drainage system directly into Stevenson Creek. This project will provide flood relief for streets and homes in the area of the Hibiscus Street Pond.

2. Glen Oaks Storm water Management Project
Description: This project is the highest ranked capital improvement project for the Stevenson Creek Watershed Management Plan. The project consists of two storm water management areas totaling approximately 22 acres in size. It will provide flood protection from a 100-year design storm for 33 structures (78 dwelling units) within the middle Stevenson Creek Basin, create approximately seven acres of vegetated wetland habitat, and provide water quality treatment for 1,193 acres of tributary drainage area.

3. Palmetto Sediment Sump
Description: This project consists of an excavated sump within Stevenson Creek, north of Palmetto Street. The sump is to be approximately 350 feet long and 80 feet wide. It will include approximately 375 linear feet of seawall, and a concrete control weir that will also serve as a barrier to sediment transport down stream into the estuary.

4. Spring Branch Conveyance Enhancements / Flood Detention Basin
Description: These two projects combined will remove 27 structures from the 100-year floodplain, stabilize the conveyance features, provide treatment and attenuate the runoff in this area of the watershed. Negotiations for the property needed for this project is underway. The City acquired the Sunset Baptist Church property in March 2003 and is negotiating with Pinellas County School Board for the remaining needed property.

5.3 Problems And Opportunities

PROBLEMS

The major problem in the downstream portion of Stevenson Creek is that years of urban growth have dramatically altered what was once a thriving, tidally influenced estuarine system into an almost barren, sluggish creek. The polluted muck that now constitutes the bottom substrate is incapable of supporting vegetation and is poor habitat to sustain juvenile fish populations or oyster beds. The decreased depth is impeding the access of large sport fishes, manatees and porpoises. Water quality has substantially declined. Historic discharges into the creek from both an older wastewater treatment facility and improperly designed septic tanks that leech into the creek have polluted the muck such that a very foul odor occurs at low tide. Problems can be synopsized as follows:

a. Intermixed soft sediments (muck) and sand cover much of the historic benthic substrate of Stevenson Creek. The sediments have a high organic content and produce a foul odor during low tide.
b. Fish populations have declined significantly. Shellfish populations have become very small and their habitat is poor.
c. Ensuing bird populations have declined.
d. The overburden of mixed organic sediments has constricted recreational opportunities and public enjoyment of the creek.
e. Water quality is poor.
f. Invasive exotic species adjacent to creek.
g. Navigation and recreation opportunities drastically reduced.
h. Loss of manatee access to safe harbor, feeding, resting and freshwater source due to shallow water conditions.

Urbanization in Stevenson Creek has dramatically increased the amount of sediments, nutrients, and bacteria in the estuary. Sediments have covered the historic hard bottom and sandy areas in Stevenson Creek. The sediments in some areas reach so close to the surface of the water that they are exposed to the air at low tide. As a result, habitats for oysters, clams, sea grasses, manatees and porpoises has been degraded and in some areas, eliminated. Populations of these and other estuary species have been reduced and will not recuperate under present conditions. Also, causeways have hindered the prior ability of Stevenson Creek to naturally flush out sediments.

OPPORTUNITIES

At the southern bank immediately upstream of the North Fort Harrison Avenue Bridge, sufficient space exists to build up a ledge to increase the fringe of mangroves that currently exist there. This will provide added acreage of habitat that is desired by juvenile fishes. There are also mud flats, which can be slightly built up and re-contoured during dredging to increase the amount of forage area for wading bird populations that have been observed using the mud flats. An increase in this habitat will bode well for wading birds.

Recent efforts by the City to improve the overall quality of the Stevenson Creek watershed will greatly reduce future sedimentation concerns by reducing the availability of new sediments. Once the existing load of much sediments form the Creek have been removed this problem is not expected to reoccur following the planned improvements and best management practices.

5.4 Objectives And Constraints

Planning objectives are the purposes of a study. They are what we are trying to achieve and give direction to the management measures and alternatives. Objectives are based on the problems and opportunities. Constraints are factors that limit what can be done. They describe what we want to avoid doing.

Development of objectives for the aquatic ecosystem restoration of Stevenson Creek began in 1999 with meetings between the City of Clearwater, Pinellas County, Florida Department of Environmental Protection, Southwest Florida Water Management District, U.S. Army Corps of

Engineers and the public. The objectives were developed to direct and focus efforts to solve the identified problems in Stevenson Creek. The City and Pinellas County are addressing Stormwater discharges and septic systems issues in the Stevenson Creek watershed. These activities are well under way and are considered complete in the Without Project condition.

The planning objectives for this aquatic ecosystem restoration study are listed below.

List of Planning Objectives:

1) Remove organic material above mean low water (-1.1 NGVD) to eliminate odor pollution
2) Increase both fish and shellfish populations
3) Improve recreational opportunities from North Fort Harrison Ave. to Douglas Ave. (Reach 1 and 2).
4) Maximize tidal flushing through out system above existing conditions
5) Reduce/eliminate spread of invasive plant species from North Fort Harrison Ave. to Douglas Ave. (Reach 1 and 2).
6) Increase bird habitat and population
7) Restore historic benthic substrate
8) Create manatee habitat

List of Constraints:

1) Maximum total federal share of cost is $5 million.
2) No adverse impacts to Threatened and Endangered Species.

5.5 Measures

A management measure is a feature or activity that can be implemented at a specific place to address one or more planning objectives. Measures for the restoration of Stevenson Creek were developed to meet at least one of the planning objectives and to avoid constraints. A measure is a feature or activity that can be implemented at a specific location to address one or more of the planning objectives; they can be either structural or non-structural. Using the combined efforts and expertise of both the USACE and sponsor interdisciplinary team and input from environmental resource agencies such as the Fish and Wildlife Service and the Florida Department of Environmental Protection several measures were developed as follows:

Measure - Remove Exotic Species:
Brazilian Pepper and Australian Pine are invasive exotic species. Sporadic Brazilian Peppers and a stand of Australian Pine located near banks of Stevenson Creek would be removed. Remove .45 acre of exotic species in Reach 1. Remove .55 acres of exotic species in Reach 2. Remove 1 acre of exotics in both Reach 1 and 2.

Measure – Muck Removal:
Approximately 196,300 cubic yards of material (greater than 20 percent fines) has accumulated above hard bottom in the part of Stevenson Creek between the U.S. Alternate 19 and Douglas Avenue Bridges. This material would be dredged from the estuary. The dredged material would be placed in a temporary disposal site near Stevenson Creek. After settling and drying, the material would be transported to existing county property.
Remove 196,000 cubic yards of sediment.

Remove 80,000 cubic yards of sediment.
Remove 115, 000 cubic yards of sediment.

Measure-Create Littoral Shelf
Create a 1.5 acre littoral shelf with sand from dredged material in Reach 1.
Create a 1.7 acre littoral shelf with sand from dredged material in Reach 1.
Create both a 1.5 acre and 1.7 acre littoral shelves with sand from dredged material in Reach 1.

Measure-Planting:
Plant 1.5 acre littoral shelf with mangroves. Plant 1.7 acre littoral shelf with mangroves. Plant 3.2 acre littoral shelf with mangroves. Plant native vegetation to replace exotics removed as necessary for bank stabilization and/or for propagation of native plant species.

Measure-Bridge Widenings:
Increase bridge cross-section widths at North Fort Harrison Bridge by 135 feet and/or increase Pinellas Trail Bridge cross-section width 115 feet.

The following table (Table 1) presents the management measures for this study and the planning objectives each measure is designed to address. Dredging sediments from the estuary and eliminating causeways meet most of the planning objectives.

TABLE 1 **PROJECT MEASURES AND OBJECTIVES**

OBJECTIVES	MEASURES							
	Dredge R1 to –3.5 ft NVGD	Dredge R2 Thalweg to -2.5ft NGVD	Dredge R2 to -2.5 ft NGVD	Create Mangrove Wetlands At elev. 1.0 ft NGVD	Remove 1 ac of Exotics From R1 & R2	Dredge R1 to -5.5 ft NGVD	Dredge R2 to -4.5 ft NGVD	Widen Bridge Cross Section NFH & PT
Protected Species	X	X	X	X		X	X	
Vegetation				X	X			
Hardgrounds	X	X	X	X		X	X	
Fish & Wildlife Resources	X	X	X	X	X	X	X	X
Essential Fish Habitat	X	X	X			X	X	X
Historic Properties	X	X	X		X	X	X	X
Navigation	X	X	X			X	X	X
Water Quality	X		X	X		X	X	X
Hazardous, Toxic & Radioactive Waste	X	X	X			X	X	X
Air Quality	X	X	X	X		X	X	

5.6 Alternatives

a. Muck removal. There are 196,300 cubic yards of mixed soft sediments (muck) and sand that cover most of the 29 acres that constitute the estuary portion of the creek (Reach 1 and Reach 2), i.e., the portion in between the North Fort Harris Ave. Bridge (NFHA) and the Douglas Ave. Bridge. The average depth of sediments is 3 feet. This measure would dredge to that depth and not backfill any material. This should expose the natural underlying substrate. Also, removal of the muck will eliminate the foul odor that occurs during low tide. Other than the main estuary portion

there is approximately 10,000 cubic yards of sediments immediately downstream of the NFHA Bridge that can be removed to improve flushing.

b. Create artificial "islands". Upstream of the Pinellas Trail bridge, there is some sediment deposition although not as much as the estuary portion of the creek. Here there are existing mudflats that can be somewhat enlarged and re-contoured by side-casting material dredged within this upstream portion of the creek. These mudflats are currently used by wading birds during low tide for foraging. The dredging in this upstream portion of the creek should help with tidal exchange and movement.

c. Clear out the thalweg (30 ft. wide at deepest point along cross-section) between Pinellas Trail and Douglas Avenue bridges Reach 2). There already exists a meandering thalweg in this upstream segment of the creek. Limited dredging and reshaping would improve water flow in this area. The material could be used (side cast) to build up the existing mudflats in the area or create additional artificial islands.

d. Reduce bridge constrictions. The three bridges crossing the area all have causeways that have no culverts and constrict the historic tidal flow, limiting circulation and tidal exchange. This has contributed to the degradation of the creek. Limited removal of the causeways and replacement with bridges should result in some additional tidal exchange and improved circulation and flushing.

e. Create artificial ledge and plant native vegetation, i.e., mangroves. A portion within the southern banks of the main estuary portion of the creek already has some mangroves. Filling it with dredged sandy material could enlarge this area. This would create an elevated ledge that could support an extension of the existing mangrove fringe providing additional habitat for many species.

f. Remove exotic vegetation. There are areas within the banks of the creek that could benefit natural species habitat by removing the exotics that have taken hold there and replacing them with native plants.

5.6.1 Measures Eliminated From Further Study

A number of measures were considered during the study process and some that were originally proposed in the Preliminary Restoration Report have been removed from further study. These include the following:

a. Culverts in causeways: Based on the experience of the teams engineers and biologists, this would be difficult and costly on the Pinellas Trail Bridge; the environmental benefits for which could not be justified. At the NFHA Bridge, the culverts cannot be installed due to a concrete pile bulkhead, which supports and frames the causeway.

b. Dredging west of the NFHA bridge: There is some sediment deposition within this area but it is not significant and dredging it would not contribute significantly to improved submerged aquatic vegetation succession.

c. Dredging east (upstream) of the Douglas Avenue Bridge: As the creek narrows east of this most upstream of the bridges, habitat gained by additional dredging would be minimal. There would be no improvement to the tidal exchange since the slowdown

occurs downstream of this bridge where the width of the creek increases. Contaminant issues were also of concern.

d. Culverts in the Douglas Avenue Bridge: The team felt that this would result in significant environmental benefits because of the contiguous wetlands immediately upstream of the bridge. It was decided however that implementation would be very costly and the additional studies and dollars required went beyond the scope of this projects' authority.

e. Planting seagrasses after muck removal: The current technical thought on this is that it has such a poor chance of survival that the high costs could not be justified.

f. Creating islands: Determined that mangrove shelves would be fiscally better, environmentally comparable and logistically easier to create. Concern was raised over how to keep the material in place at island areas.

5.6.2 Evaluation of Remaining Alternatives

Alternative plans were crafted based on combinations of the measures considered above. A hydrodynamic analysis was then performed to gauge impacts to flow/tidal flushing on alternatives 1-7 and 9, which is one of the objectives developed to screen alternatives. Please note that there is no alternative 8. The alternatives are numbered 1-7 and 9-12. For this report the term thalweg is used to depict an area 30 feet wide at the deepest point along the cross-section of the creek. The plans are described as follows:

No action alternative (status quo)

A "no action" alternative would allow natural succession to continue. Such an alternative would continue waterway degradation from sedimentation, and would eliminate open water habitat, shift species composition, and alter community structure (ecological succession). A no action alternative would see the emergence of a secondary ecosystem and associate dependent species, producers, and decomposers. Recreational values and benefits would shift, oxygen supply would decrease and only species with low oxygen requirements would survive. Elevations changes would also result, with a collapse of past uses and economic benefits. The ability of the Stevenson Creek basin to provide drainage to the ±6,000-acre watershed would be severely impeded. Flooding potential would also increase to surrounding lands.

Alternative 1–Dredge Reach 1 (R1) Area Between NFH and PT, Create Mangrove Shelf, and Remove Exotics.

This alternative would dredge R1 to a depth of –3.5 feet NGVD to remove existing material, primarily 56 percent muck. Dredged sand would be used to create a 1.5-acre mangrove shelf at elevation 1.0 foot NGVD on SW shoreline. Remove .45 acres of exotic plants. Hydraulically this alternative would not provide the desired circulation improvements to the Stevenson Creek estuarine system. (Engineering Appendix B). This alternative would provide 14.66 habitat units.

Alternative 2 – Dredge Reach 1 Area Between NFH and Pinellas Trail, Create Mangrove Shelf, Remove Exotics and Dredge Reach 2 (R2) Thalweg.

This alternative includes all the components of Alternative 1 and incorporates dredging of a naturally occurring thalweg between the Douglas Avenue Bridge and Pinellas Trail Bridge. The thalweg would be dredged to a width of 30 feet and a depth of –2.5 feet NGVD. Approximately 7,500 to 10,000 cubic yards of material would be dredged, primarily sand. In addition, 1.7 acres of a mangrove shelf would be created along the SE shoreline and .55 acres of exotic plants would be removed in Reach 2. Intermediate circulation improvements were identified with alternatives that dredged Reach 1 in entirety and only dredged along the thalweg, creating a continuous nominal –2.5 feet deep channel between Pinellas Trail Bridge and Douglas Avenue Bridge. This alternative would realize 17.88 habitat units.

Alternative 3 – *Dredge R1 Between NFH and Pinellas Trail, Create Mangrove Shelves, Remove Exotics, and Widen NFH Bridge Cross-section.*

This alternative includes dredging Reach 1 to –3.5 ft. NGVD, a 1.5 ac mangrove shelf and 1.7 acre mangrove shelf in Reach 1, removal of 1 acre of exotic plants (.45 ac. in Reach 1 and .55 ac. in Reach 2) and incorporated dredging to widen the North Fort Harrison bridge cross-section by 135 feet, to provide an overall width of 250 feet. Hydraulically, this alternative would not provide the desired circulation improvements to the Stevenson Creek estuarine system. Bridge modifications have minimal influence on the overall water surface elevation dynamics in Stevenson Creek. This alternative would provide 16.44 habitat units.

Alternative 4 – Dredge R1 Between NFH and Pinellas Trail, Create Mangrove Shelf, Widen NFH Cross Section, remove Exotics and Dredge Thalweg (R2).

This alternative would dredge Reach 1 to –3.5 ft. NGVD, create a total of 3.2 acres of mangrove shelf, remove .45 acres of exotics, dredge the thalweg in Reach 2 to –2.5 ft. NGVD and widen the North Fort Harris Cross Section in Reach 1 by 135 ft. Intermediate improvements to circulation were identified with a reduced dredging plan associated with the shore to shore dredging in Reach 1 and only dredging along the thalweg creating a continuous nominal -2.5 feet deep channel between Pinellas Trail Bridge and Douglas Avenue Bridge. Bridge modifications have minimal influence on the overall water surface elevation dynamics in Stevenson Creek. This alternative would provide 18.06 habitat units.

Alternative 5 – Dredge R1 Between NFH and Pinellas Trail, Create Mangrove Shelf, Remove Exotics, Widen NFH Cross Section, Dredge R2 Thalweg, and Widen PT Cross Section.

This alternative includes all components of Alternative 4 and incorporates dredging to widen the cross-section at the Pinellas Trail Bridge by 115 feet to provide an overall cross-section of 232 feet. This alternative was found to improve the overall circulation in Stevenson Creek. Bridge modifications have minimal influence on the overall water surface elevation dynamics in Stevenson Creek. Bridge modifications have minimal influence on the overall water surface elevation dynamics in Stevenson Creek. This alternative would provide 18.19 habitat units.

Alternative 6 – Dredge R1, Create Mangrove Shelf, Remove Exotics, Widen NFH Cross-Section, Dredge R2 Complete Area Between PT and DA, and Widen PT Cross-Section.

This alternative includes all components of Alternative 5, with exception of dredging the thalweg area. The complete area of R2 would be dredged at –2.5 ft. NGVD to remove about 35,000 cubic yards of material, primarily sand. This alternative was found to generally result in the greatest improvements with the lowest low water conditions. It also improved the overall circulation in Stevenson Creek. Bridge modifications have minimal influence on the overall water surface elevation dynamics in Stevenson Creek. This alternative would provide 26.25 habitat units.

Alternative 7 – Dredge R1, Widen NFH Cross Section, Widen PT Cross-Section, Dredge R2 Area Between PT and Douglas Avenue, Remove Exotics.

This alternative would dredge all of R1 and R2 as in alternative 6 plus widen the cross-sections in R1 (North Fort Harris Bridge) and R2 (Pinellas Trail Bridge), remove 1 acre of exotic plants (.45 ac. R1 and .55 ac. R2). Alternative 7 is a sensitivity type assessment that examines the influence of the raised mangrove shelf in Reach 1. * The 3.2 acre mangrove shelf in Reach 1 was found to have minimal influence on water surface elevations away from the immediate shelf area, indicating that this feature is predicted to have minimal to no impact to the overall elevation hydrodynamics in Stevenson Creek. This alternative improved overall circulation in Stevenson Creek based on water surface elevation assessments. This alternative was also found to generally result in the greatest improvements with the lowest low water conditions. Bridge modifications have minimal influence on the overall water surface elevation dynamics in Stevenson Creek. This alternative would provide 23.85 habitat units.

*When the modeling was performed the mangrove shelf was configured at 3.2 acres along the southwest shoreline of Reach 1. After a site visit, it was determined that the mangrove shelf could not be that large, due to the presence of 4 run-off drainage pipes. The mangroves would block and interfere with the function of these pipes. The new configuration is for a 1.5 acre mangrove shelf along the southwest shoreline and a 1.7 acre mangrove shelf along the southeast shoreline of Reach 1 (See Figure 5). Total mangrove habitat created remains the same at 3.2 acres.

THERE IS NO ALTERNATIVE 8.

Alternative 9 – Dredge Reach 1 Between NFH and PT, Create Mangrove Shelves, Remove Exotics, Dredge Reach 2 Area Between PT and DA. .

This alternative would dredge R1 to a depth of –3.5 feet NGVD, R2 to a depth of –2.5 feet NGVD, and would create 3.2 acres of mangrove shelves within R1 and remove 1 ac. of exotic plants (.45 ac R1 and .55 ac. R2). Improves overall circulation in Stevenson Creek based on water surface elevation assessments. Also found to generally result in the greatest improvements with the lowest low water conditions. This alternative would provide 25.91 habitat units.

Alternative 10- Dredge Reach 1 to –5.5 ft. NGVD (North Fort Harris to Pinellas Trail), Create Mangrove Shelves, and Remove Exotics.

This alternative would dredge Reach 1 to –5.5 ft. NGVD, Create 3.2 acres of mangrove shelves along southern shoreline of Reach 1. Remove .45 exotic plants in Reach 1. Subtle to no differences in water levels are predicted for this alternative as they were for alternatives 1 and 3 where only Reach 1 was dredged. This alternative would provide 17.09 habitat units.

Alternative 11- Dredge Reach 1 to –5.5 ft. NGVD (North Fort Harris to Pinellas Trail), Dredge Reach 2 to –4.5 NGVD (Pinellas Trail to Douglas Ave.), Create Mangrove Shelves, and Remove .45 ac. Exotics.

This alternative would dredge Reach 1 to –5.5 ft. NGVD. Create 3.2 acres of mangrove shelves along southern shoreline of Reach 1. Remove .45 exotic plants in Reach 1. Deepening Reach 1 by the removal of the muck materials along with additional dredged deepening in Reach 2 appears to provide the biggest improvements in the overall tidal characteristics in Stevenson Creek. This alternative would provide 27.62 habitat units.

Alternative 12- Dredge Reach 1 –5.5 ft. NGVD (North Fort Harris to Pinellas Trail), Dredge Reach 2 to –4.5 ft. NGVD (Pinellas Trail to Douglas Ave.), Create Mangrove Shelves, and Remove 1 ac. Exotics.

This alternative would dredge Reach 1 to –5.5 ft. NGVD and dredge Reach 2 to –4.5 ft. NGVD. Create two wetland sites for a total of 3.2 acres. One mangrove shelf would be 1.5 acres and the mangrove shelf would be 1.7 acres in size. Both mangrove shelves are in Reach 1. Remove 1 acre of exotic plants, .45 acres in Reach 1 and .55 acres in Reach 2. Deepening Reach 1 by the removal of the muck materials along with additional dredged deepening in Reach 2 appears to provide the biggest improvements in the overall tidal characteristics in Stevenson Creek. This alternative would provide 27.92 habitat units.

Alternatives 10, 11 and 12 were not modeled; because of funding availability, these alternatives were added after the modeling was complete. It was believed based on engineering judgment, that flushing would only be improved by removing the muck to a deeper depth. The positive effects of these alternatives with respect to Threatened and Endangered Species, in particular, the West Indian Manatee, also seems to be a very important reason to look at these alternatives. See Plate 1 and 2 for project features.

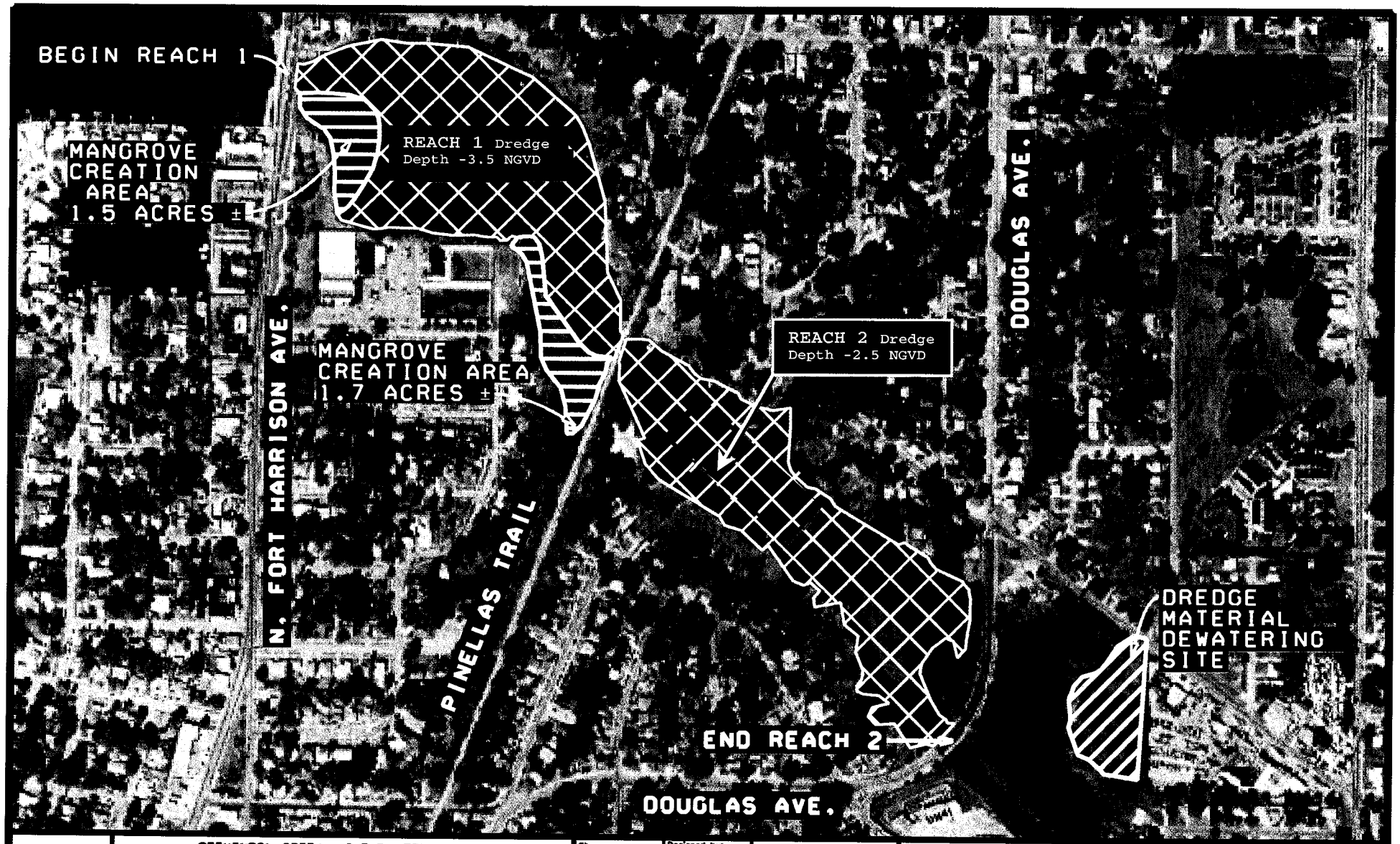


PLATE 1

STEVENSON CREEK - CLEARWATER, FLORIDA

PROJECT FEATURES

File name:

Reference files:

Designed by: J.W.M.

Drn by: J.W.M. Ckd by: J.W.M.

Dated:

Scale: 1"=500'

Plot date: Jan. 27, 2003

Plot scale: 1"=500'

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

US Army Corps of Engineers
Jacksonville District

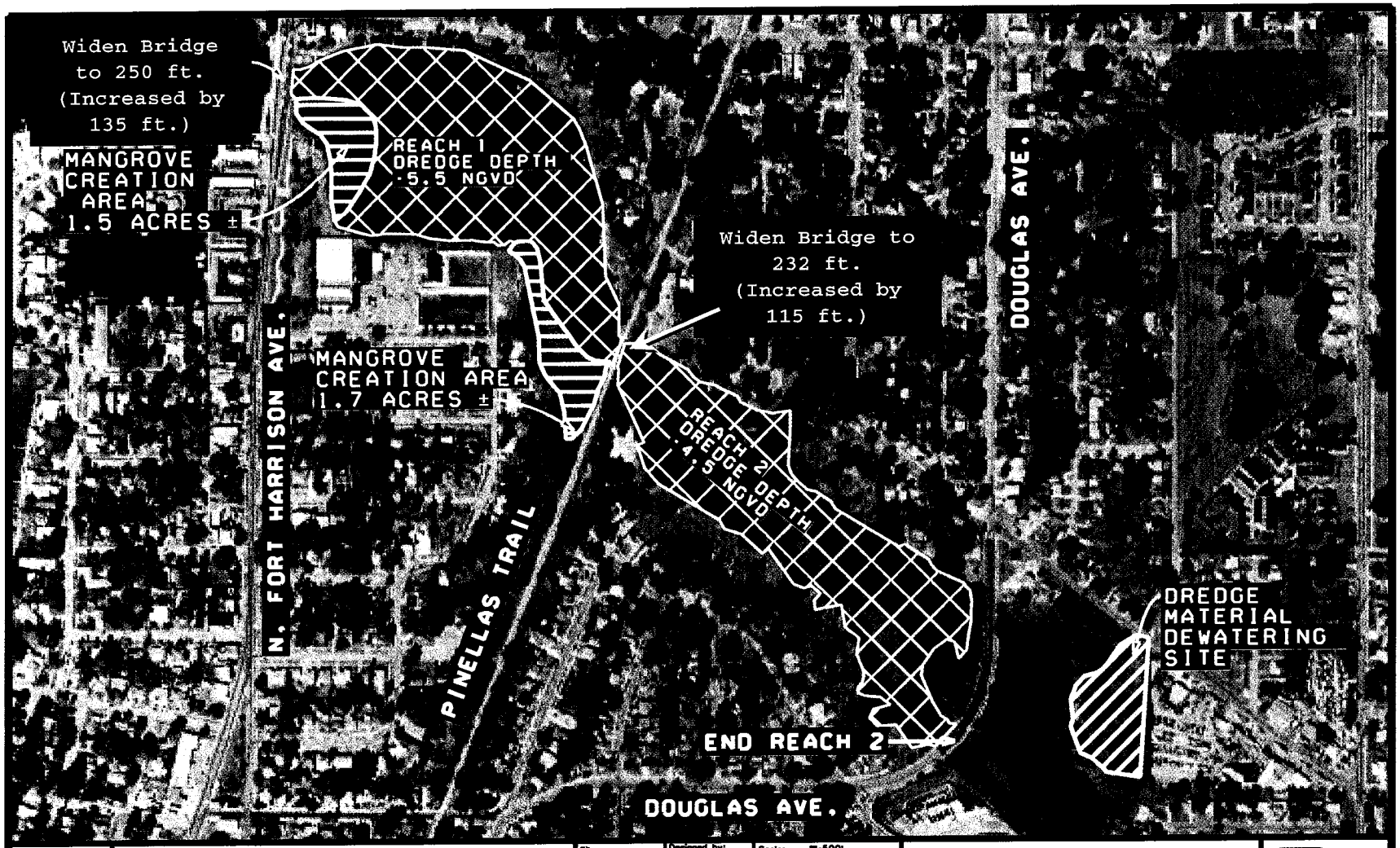


PLATE 2

STEVENSON CREEK - CLEARWATER, FLORIDA

PROJECT FEATURES

File name:

Reference files:

Designed by: J.W.M.

Drawn by: J.W.M.

Ckd by: J.W.M.

Dated:

Scale: 1"=500'

Plot date: Jan. 27, 2003

Plot scale: 1"=500'

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

US Army Corps of Engineers
Jacksonville District

5.7 Comparison Of Alternative Plans

Policy requires the use of four screening criteria in the screening and evaluation of alternative plans. The criteria are acceptability, completeness, effectiveness, and efficiency.

Acceptability is the workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies. One aspect of acceptability is whether the alternative is feasible or doable with regard to technical, environmental, economic, social, or similar reasons.

Completeness is the extent to which an alternative plan includes and accounts for all necessary investments or other actions to ensure the realization of the planned effects.

Effectiveness is the extent to which an alternative plan contributes to the attainment of the planning objectives (alleviates problems and achieves opportunities). The most effective alternatives make significant contributions to all of the planning objectives. Less effective alternatives make smaller contributions to one or more of the objectives. Effectiveness is a matter of degree rather than all or nothing.

Efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating problems and realizing opportunities, consistent with protecting the Nation's environment. It is a measure of allocation of resources. Cost-effectiveness is one common measure of efficiency. Both monetary and non-monetary costs are considered. Opportunity costs are also considered.

Table 2 summarizes the contributions that each alternative makes toward the restoration planning objectives and presents the findings for the alternatives with respect to the four evaluation criteria. All alternatives avoid the planning constraints, relative to the Future Without Project Condition.

This section of the report describes the effects of each plan and compares them to the future without project condition. Several reports describe effects and evaluate the alternatives, the disposal needs, contained in Appendix A of this report, the Environmental Assessment (EA) prepared for this report, and the Coordination Act Report prepared by the U.S. Fish and Wildlife Service, an appendix of the EA. Refer to these reports for detailed descriptions of beneficial and adverse impacts.

There would be a temporary decline in water quality while any dredging is in progress. Water quality and odor would be improved once the sediments are removed from the system. There would be a temporary increase in noise during dredging. There would be a decrease of intertidal mud flats. Hard bottom would be exposed after dredging. Much of this surface would be available and suitable for colonization by aquatic plants.

The velocity of water in most areas of Stevenson Creek east of the U.S. Alternate 19 causeway would be comparable to the without project condition. Dredged material would be transported to a City owned landfill approximately 21 miles a way.

Since this is an ecosystem restoration project, most benefits occur in the Environmental Quality (EQ) account. Dollar values for project benefits and benefit/cost ratios are not presented in the National Economic Development (NED) account because the benefits of the project are not expressed in monetary terms, in accordance with policy. This project does not generate traditional NED benefits, such as navigation, flood control, storm damage reduction, or water supply.

Table 2: Stevenson Plan Comparison Summary

	ALTERNATIVES					
	No Action	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**
1. PLAN DESCRIPTION	See text	Dredge R1 (-3.5 ft), 1.5-ac wetland (R1 at SW), exotic removal (0.45-ac) in R1	Dredge R1 (-3.5ft), 1.5 ac. wetland, exotic plant removal .45 ac & Thalweg in R2 (-2.5ft), 1.7-ac wetland (R1 at SE), exotic removal (0.55-ac) in R2	NFH widened to 250' Dredge R1 (-3.5ft), 3.2-ac wetland in R1 (1.7-ac at SE, 1.5-ac at SW), exotic removal (1-ac total; 0.45-ac in R1 & 0.55-ac in R2)	NFH 250', R1 dredge (-3.5ft), R2 Thalweg dredge (-2.5ft), 3.2-ac wetland in R1, exotic removal (1-ac)	NFH widened to 250', Dredge R1 (-3.5ft), widen PT to 232', Dredge Thalweg In R2 (-2.5ft), 3.2-ac wetland in R1, exotic removal (1-ac)
2. IMPACT ASSESSMENT						
A. National Ecosystem Restoration (NER)						
Estimated Construction Cost	$0	$2,812,800	$2,942,613	$5,721,555	$5,847,110	$6,194,846
Habitat Units (HU)	0	14.66	17.88	16.44	18.06	18.19
Cost per Habitat Units (HU) restored ($/HU)	$0	191,869	164,576	348,026	323,760	340,563
RANK:		3	2	11	9	10
B. Environmental Quality (EQ)						
(1) Hazardous Toxic & Radioactive Wastes (HTRW)	Continued accumulation of HTRWs in bottom sediments	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Partial removal of pollutants and contaminants from 16.60 ac. bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Partial removal of pollutants and contaminants from 20.2 ac. bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Partial removal of pollutants and contaminants from 16.60ac. bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Partial removal of pollutants and contaminants from 20.2ac. bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Partial removal of pollutants and contaminants from 20.2ac. bottom substrate
(2) Water Quality	Continued degradation from build-up of sediments and muck	Impact: Temp. suspension & turbidity during dredging Benefit: Improvements to flushing, water clarity, photic zone, Oxygen levels and overall bio, physical & characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & characteristics
(3) Vegetation	No impact Continued growth of mangrove seedlings in R2	No impacts. Benefits: Creation of 3.2 ac. of mangrove habitat. Removal of 1 ac. of exotics	Impact to mangrove seedlings growing in shallow areas of R2. Benefits: Creation of 3.2 ac. of mangrove habitat. Removal of 1 ac. of exotics.	No impacts. Benefits: Creation of 3.2 ac. of mangrove habitat. Removal of 1 ac of exotics.	Impact to mangrove seedlings growing in shallow areas of R2. Benefit: Creation of 3.2 ac. of mangrove habitat. Removal of 1 ac. of exotics.	Impact to mangrove seedlings growing in shallow areas of R2. Benefit: Creation of 3.2 ac. of mangrove habitat. Removal of 1 ac of exotics.
(4) Navigation	Continued Impact to navigation during low tide cycles with increased loss of depth due to sedimentation.	Impact: Temp during construction Benefit: Increased depth in R1 only.	Impact: Temp during construction Benefit: Increased depth in R1 and thalweg of R2.	Impact: Temp during construction Benefit: Increased depth in R1 only.	Impact: Temp during construction Benefit: Increased depth will provide increased navigation in R1 and increased navigation in the center channel of R2.	Impact: Temp during construction Benefit: Increased depth will provide increased navigation in R1 and increased navigation in the center channel of R2.
(5) Protective Species	No Impact, No access for manatees	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, and foraging area for	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, and foraging area for	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, and foraging area

		access, and foraging area for manatee in Reach 1	access, and foraging area for manatee in Reach 1	manatee in Reach 1	manatee in Reach 1	for manatee in Reach 1
(6) Fish Habitat	Continued Impact from sedimentation poor water quality in both Reaches.	Impact: Potential direct & indirect impact to benthics during dredging. Continued degradation of sediments and water quality in R2. Benefit: Improvement to substrate and water quality in R1	Impact: Potential direct & indirect impact to benthics during dredging. Continued sediment and water quality problems in R2. Benefit: Improvement to substrate in R1 and thalweg in R2	Impact: Potential direct & indirect impact to benthics during dredging. Continued degradation of sediments and water quality in R2. Benefit: Improve substrate in R1	Impact: Potential direct & indirect impact to benthics during dredging. Continued sediment and water quality problems in R2 Benefit: Improved substrate and water quality in R1, improved substrate in thalweg area of R2	Impact: Potential direct & indirect impact to benthics during dredging. Continued sediment and water quality problems in R2 Benefit: Improved substrate and water quality in R1, improved substrate in thalweg area of R2
(7) Fish & Wildlife	Continued impact from loss of habitat and aquatic value.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.
(8) Cultural and Historic Properties	No change	No Impact	No Impact	No Impact	No Impact	No Impact
(9) Hardground	No Impact	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.
RANK:		3	5	4	4	4
C. Regional Economic Development (RED)	No net effect					
D. Other Social Effects (OSE)						
Life, Health and Safety	Continued odor pollution, sediment contamination and poor water quality	Improved odor pollution, sediment contamination and water quality to R1.	Improved odor pollution, sediment contamination and water quality to R1 and thalweg area of R2	Improved odor pollution, sediment contamination and water quality to R1.	Improved odor pollution, sediment contamination and water quality to R1 and thalweg area of R2	Improved odor pollution, sediment contamination and water quality to R1 and thalweg area of R2
Environmental Justice	No change	Does not contribute to Environmental Justice Program.	Contributes to the Environmental Justice Program.	Contributes to the Environmental Justice Program.	Contributes to the Environmental Justice Program.	Contributes to the Environmental Justice Program.
Recreation	No change, poor recreation opportunities	Increased recreation in R1 only.	Increased recreation in R1 and thalweg of R2.	Increased recreation in R1 only.	Increased recreation in R1 and thalweg of R2.	Increased recreation in R1 and thalweg of R2.
RANK:		5	3	4	3	3

Table 2: Stevenson Plan Comparison Summary (Continued)

	ALTERNATIVES					
	No Action	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**
3. PLAN EVALUATION						
A. Contribution to Planning Objectives						
(1) Restore historic benthic substrate	Does not meet objective	Partially meets objective	Partially meets objective	Does not meet objective	Partially meets objective	Partially meets objective
(2)Remove organic sediment above mean low water to remove odor pollution through out system	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective
(3)Maximize tidal flow through out system above existing conditions.	No increase	Increase flow area 570 sq. ft.	Increases flow area by 630 sq. ft.	Increases flow area by 570 sq. ft.	Increases flow area by 630 sq. ft.	Increases flow are by 630 sq. ft.
(4) Increase fish and shellfish populations	Does not meet objective	Partially meets objective	Partially meets objective	Does not meet objective	Partially meets objective	Partially meets objective
(5) Increase bird habitat and populations	Does not meet objective	Does not meet objective	Meets objective	Meets objective	Meets objective	Meets objective
(6) Improve recreational opportunities in Reach 1 and 2	Does not meet objective	Does not meet objective	Meets objective	Does not meet objective	Meets objective	Meets objective
(7) Create manatee habitat	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective
(8) Reduce/eliminate spread of exotic plants in Reach 1 and 2	Does not meet objective	Does not meet objective	Meets objective	Meets objective	Meets objective	Meets obje6tive
RANK:		9	6	7	6	6
B. Response to Planning Constraints						
(1) Maximum federal share of cost $5 mil	N/A	Meets constraint	Meets constraint	Meets constraint	Meets constraint	Meet constraint
(2) No adverse impacts to Threatened and Endangered species	Meets constraint	Meets constraint	Meets constraint	Meets constraint	Meets constraint	Meets constraint
RANK:		1	1	1	1	1
C. Response to Evaluation Criteria						
Acceptability	Not acceptable	Least acceptable	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Completeness	Not complete	Least complete	Not complete	Not complete	Partially complete	Not complete
Effectiveness	Not effective	Least effective	Partially effective	Not effective	Partially effective	Partially effective
Efficiency	Not efficient	Partially efficient	Partially efficient	Least efficient	Not efficient	Not efficient
RANK:		5	6	6	3	5
OVERALL RANK		4	3.67	5.33	4.17	4.67

Table 2: Stevenson Plan Comparison Summary

	ALTERNATIVES					
	Alt 6	**Alt 7**	**Alt 9**	**Alt 10**	**Alt 11**	**Alt 12**
1. PLAN DESCRIPTION	NFH widen to 250', Dredge R1 (-3.5ft), widen PT to 232', Dredge R2 (-2.5ft), 3.2-ac wetland in R1, exotic removal (1-ac)	NFH widen 250', R1 dredged (-3.5ft), PT widen 232', R2 dredged (-2.5ft), exotic removal (1-ac)	R1 dredge (-3.5ft), R2 dredge (-2.5ft), 3.2-ac wetland in R1, exotic removal (1-ac)	Dredge R1 (-5.5ft), 3.2-ac wetland in R1, exotic removal (0.45-ac)	Dredge R1 (-5.5ft), Dredge R2 (-4.5ft), 3.2-ac wetland in R1, exotic removal (0.45-ac)	Dredge R1 (-5.5ft), Dredge R2 (-4.5ft), 3.2-ac wetland in R1, exotic removal (1-ac)
2. IMPACT ASSESSMENT						
A. National Ecosystem Restoration (NER)						
Estimated Construction Cost	$6,945,866	$6,892,741	$3,722,754	$3,537,246	$6,208,911	$6,214,067
Habitat Units (HU)	26.25	23.85	25.91	17.09	27.62	27.92
Cost per Habitat Units (HU) restored ($/HU)	264,604	289,004	143,680	206,976	224,798	222,567
RANK:	7	8	1	4	6	5
B. Environmental Quality (EQ)						
(1) Hazardous Toxic & Radioactive Wastes (HTRW)	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Possible removal of pollutants and contaminants from 29 ac. of bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Possible removal of pollutants and contaminants from 29 ac. of bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Possible removal of pollutants and contaminants from 29 ac. of bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Possible removal of pollutants and contaminants from 16.6 ac. of bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Possible removal of pollutants and contaminants from 29 ac. of bottom substrate	Impact: Possible disturbance to contaminated sediments & suspension of elutriate waters Benefit: Possible removal of pollutants and contaminants from 29 ac. of bottom substrate
(2) Water Quality	Impact: Temp. suspension & turbidity during dredging Benefit: High Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & chemical characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: High Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & chemical characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: High Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & chemical characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: Maximum improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & chemical characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: Maximum Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & chemical characteristics	Impact: Temp. suspension & turbidity during dredging Benefit: Maximum Improvements to flushing, water clarity, photic zone, oxygen levels and overall bio, physical & chemical characteristics
(3) Vegetation	Impact: Mangrove seedlings growing in shallow areas of R2. Benefit: Creation of 3.2 ac. of mangrove habitat Removal of 1.ac of Invasive	Impact: Mangrove seedlings growing in shallow areas of R2. Benefit: Removal of 1.ac of Invasive	Impact: Mangrove seedlings growing in shallow areas of R2. Benefit: Creation of 3.2 ac. of mangrove habitat Removal of 1.ac of Invasive	Impact: Mangrove seedlings growing in shallow areas of R2. Benefit: Creation of 1.5 acres of mangrove habitat	Impact: Mangrove seedlings growing in shallow areas of R2. Benefit: Creation of 1.7 acres of mangrove habitat.	Impact: Mangrove seedlings growing in shallow areas of R2. Benefit: Creation of 3.2 acres of mangrove habitat.
(4) Navigation	Impact: Temp. during construction Benefit: Increased depth to R1 and R2.	Impact: Temp. during construction Benefit: Increased depth to R1 and R2.	Impact: Temp. during construction Benefit: Increased depth to R1 and R2.	Impact: Temp. during construction Benefit: Greater depths bank to bank in R1 and R2 will provide greater navigation opportunities	Impact: Temp. during construction Benefit: Greater depths bank to bank in R1 will provide greater navigation opportunities in r1 only.	Impact: Temp. during construction Benefit: Greater depths bank to bank in R1 and R2 will provide greater navigation opportunities for the life of the project.

				for the life of the project.		
(5) Protected Species	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, and foraging area for manatee in Reach 1	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, and foraging area for manatee in R1	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, and foraging area for manatee in Reach 1	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, and foraging area for manatee in Reach 1	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, freshwater access, safe harbor foraging area for manatee in Reach 1 and 2	Impact: Minimal potential to effect manatee during construction Benefit: Increased depth, habitat access, freshwater access, safe harbor and foraging area for manatee in Reach 1 and 2
(6) Fish Habitat	Impact: Potential direct & indirect impact to benthics during dredging Benefit: Substrate and water quality improvements to both Reaches	Impact: Potential direct & indirect impact to benthics during dredging Benefit: Substrate improvements to both Reaches	Impact: Potential direct & indirect impact to benthics during dredging Benefit: Substrate improvements to both Reaches	Impact: Potential direct & indirect impact to benthics during dredging Benefit: Substrate improvements to both Reaches	Impact: Potential direct & indirect impact to benthics during dredging. Continued degradation of sediment and water quality in Reach 2. Benefit: Substrate improvements to Reach 1.	Impact: Potential direct & indirect impact to benthics during dredging Benefit: Substrate and water quality improvements to both Reaches. Removes all existing muck in both Reaches.
(7) Fish & Wildlife	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.	**Dredging will** eliminate waterway fishery holes. Dredging would be beneficial. It would restore habitat, cause an increase to benthic invertebrates and vertebrates foraging area, and lead to increased use by birds and juvenile sport fish species.
(8) Cultural Resources & Historic Properties	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
(9) Hardground	Dredging has potential to remove area from shellfish production at NFH. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production at NFH.	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production at NFH. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.	Dredging has potential to remove area from shellfish production. Creation of mangroves (3.2ac.) beneficial by providing shellfish growing & collection areas.
RANK:	2	6	2	2	2	1
C. Regional Economic Development (RED)				No net effect		
D. Other Social Effects (OSE)						
Life, Health and Safety	Improved odor pollution, sediment contamination and water quality of R1 & R2.	Improved odor pollution, sediment contamination and water quality of R1 & R2.	Improved odor pollution, sediment contamination and water quality of R1 & R2.	Improved odor pollution, sediment contamination and water quality of R1.	Improved odor pollution, sediment contamination and water quality of R1 & R2.	Improved odor pollution, sediment contamination and water quality of R1 & R2.
Environmental Justice	Contributes to the Environmental Justice Program.	Contributes to the Environmental Justice Program.	Contributes to the Environmental Justice Program.	Does not contribute to Environmental Justice Program.	Contributes to Environmental Justice Program.	Contributes to the Environmental Justice Program.
Recreation	Increased recreation in R1 and R2.	Increased recreation in R1 and R2.	Increased recreation in R1 and R2.	Increased recreation in R1 only.	Largest increase to recreation Opportunities.	Largest increase to recreation Opportunities
RANK:	2	2	2	5	1	1

Table 2: Stevenson Plan Comparison Summary (Continued)

	ALTERNATIVES					
	Alt 6	Alt 7	Alt 9	Alt 10	Alt 11	Alt 12
3. PLAN EVALUATION						
A. Contribution to Planning Objectives						
(1) Restore historic benthic substrate	Meets objective	Meets objective	Meets objective	Does not meet objective	Meets objective	Meets objective
(2)Remove organic sediments above mean low water to eliminate odor pollution through out system	Does not meet objective	Does not meet objective	Meets objective	Does not meet objective	Meets objective	Meets objective
(3) Increase tidal flow through system above existing conditions	Flow area increased by 866 sq. ft.	Flow area increased by 866 sq. ft.	Flow area increased by 866 sq. ft.	Flow area increased by 1290 sq. ft.	Flow area increased by 1740 sq. ft.	Flow area increased by 1740 sq. ft.
(4) Increase fish and shellfish populations	Meets objective	Meets objective	Meets objective	Does not meet objective	Meets objective	Meets objective
(5) Increase bird habitat and populations	Meets objective	Does not meet objective	Meets objective	Meets objective	Meets objective	Meets objective
(6) Improve recreational opportunities in Reach 1 and 2	Meets objective	Meets objective	Meets objective	Does not meet objective	Meets objective	Meets objectives
(7) Create manatee habitat	Does not meet objective	Does not met objective	Does not meet objective	Meets objective in R1 only	Meets objective in R1 and R2	Meets objective
(8) Remove/eliminate spread of exotic plants within Reach 1 and 2.	Meets objective	Meets objective	Meets objective	Does not meet objective	Does not meet objective	Meets objective
RANK:	4	53	2	8	2	1
B. Response to Planning Constraints						
(1) Maximum federal share of cost $5 mil	Exceeds constraint	Exceeds constraint	Meets constraint	Meets constraint	Meets constraint	Meets constraint
(2) No adverse impacts to Threatened and Endangered species	Meets constraint	Meets constraint	Meets constraint	Meets constraint	Meets constraint	Meets constraint
RANK:	2	2	1	1	1	1
C. Response to Evaluation Criteria						
Acceptability	Not acceptable	Not acceptable	Not fully acceptable	Not fully acceptable	Partially acceptable	Fully acceptable
Completeness	Partially complete	Not complete	Partially complete	Not complete	Partially complete	Most complete
Effectiveness	Partially effective	Not effective	Partially effective	Not effective	Fully effective	Most effective
Efficiency	Not efficient	Not efficient	Second most efficient	Partially efficient	Partially efficient	Most efficient
RANK:	3	6	3	4	3	1
OVERALL RANK	3.17	4.67	1.83	3.67	2.33	1.67

COMPARISON OF HABITAT VALUES FOR ALTERNATIVES

Table 3.

ALTERNATIVES	ACRE(S)		VALUE		UNITS
1.1.1 ALTERNATIVE 1					
1) Dredge R1 to –3.5 ft NGVD	16.60 ac	x	.80	=	13..28
2) Create 1.5 ac Wetland (R1 at SW)	1.50 ac	x	.75	=	1.13
3) Remove.45 acre of Exotics (R1)	.45 ac	x	.55	=	.25*
	TOTAL HABITAT UNITS				**14.66**
1.1.2 ALTERNATIVE 2					
1-3) Dredge R1 (-3.5 ft), Create Wetland & Rem Exotics					14.66
4) Dredge R2 Thalweg Only (–2.5 ft NGVD)	3.60 ac	x	.45	=	1.62
5) Create 1.7 ac Wetland (R1 at SE)	1.70 ac	x	.75	=	1.30*
6) Remove .55 ac of Exotics (R2)	.55 ac	x	.55	=	.30
	TOTAL HABITAT UNITS				**17.88**
1.1.3 ALTERNATIVE 3					
1) Dredge R1 (-3.5 ft)					13.28
2) Create 3.2 ac Wetland R1 (SW[1.5 ac] SE[1.7 ac])	3.20 ac	x	.75	=	2.40*
3) Remove 1.0 ac Exotics (R1[.45 ac] & R2[.55 ac])	1.00 ac	x	.55	=	.55
4) Widen NFH Cross-Section (R1)	,34 ac	x	.62	=	.21*
	TOTAL HABITAT UNITS				**16.44**
1.1.4 ALTERNATIVE 4					
1-3) Dredge R1 (–3.5 ft) Create Wetland, Rem.Exotics					16.23
4) Dredge R2 Thalweg Only (-2.5 ft)					1.62
5) Widen NFH Cross-Section					.21
	TOTAL HABITAT UNITS				**18.06**
1.1.5 ALTERNATIVE 5					
1-3) Dredge R1(-3.5 ft), Create Wetland, & Rem.Exotics					16.23
4-5) Dredge R2 Thalweg Only & Widen NFHB X-Sect					1.83
6) Widen PTB Cross-Section	.21 ac	x	.62		.13
	TOTAL HABITAT UNITS				**18.19**
1.1.6 ALTERNATIVE 6					
1) Dredge R1 (-3.5 ft) & R2 Entire Area (-2.5 ft)	28.70 ac	x	.80	=	22.96
2-3) Create Wetland (3.2 ac) & Remove Exotics (1 ac)					2.95
4) Widen NFHB & PTB Cross-sections	.55	x	.62		.34
	TOTAL HABITAT UNITS				**26.25**
1.1.7 ALTERNATIVE 7					
1) Dredge R1 –3.5 ft) & R2 (-2.5 ft)					22.96
2) Widen NFHB & PTB Cross-Sections					.34
3) Remove Exotics (R1[.45 ac]& R2 [.55 ac])					.55
	TOTAL HABITAT UNITS				**23.85**
1.1.8 ALTERNATIVE 9					
1) Dredge R1(-3.5 ft & R2 (-2.5 ft)					22.96
2) Create 3.2 ac Wetland R1 (1.5 ac[SW] & 1.7 ac[SE]					2.40
3) Remove 1 ac of Exotics (R1[.45 ac]& R2 (.55 ac)					.55
	TOTAL HABITAT UNITS				**25.91**
EXPANDED ALTERNATIVES ENVIRONMENTAL HABITAT UNITS					
1.1.9 ALTERNATIVE 10					
1) Dredge R1 to –5.5 ft NGVD	16.60 ac	x	.87	=	14.44
2) Create 3.2 ac Wetland R1 (1.5 ac [SW]& 1.7 ac [SE])					2.40
3) Remove Exotics (.45 ac in R1)	.45 ac	x	.55		.25*
	TOTAL HABITAT UNITS				**17.09**
1.1.10 ALTERNATIVE 11					
1-3) Dredge R1 (-5.5 ft),Create Wetland& Rem. Exotics					17.09
4) Dredge R2 to –4.5 ft NGVD	12.10 ac	x	.87		10.53*
	TOTAL HABITAT UNITS				**27.62**
1.1.11 ALTERNATIVE 12					
1) Dredge R1(-5.5 ft) & R-2 (-4.5 ft)	28.70 ac	x	.87	=	24.97*
2) Create 3.2 ac Wetland R1 (1.5 ac[SW]& 1.7 ac[SE])					2.40
3) Remove Exotics (R1 {.45 ac] & R2 [.55 ac])	1.00 ac	x	.55	=	.55
	TOTAL HABITAT UNITS				**27.92**

COMPARISON OF HABITAT VALUES BY FEATURE

Table 4.
EXISTING AND POTENTIAL
ENVIRONMENTAL HABITAT VALUES AND HABITAT UNITS

HABITAT INDEX	EXISTING ACRES	EXISTING VALUE (0-1)	EXISTING HABITAT UNITS	WITH PROJECT ACRES	WITH PROJECT HABITAT VALUE (0-1)	WITH PROJECT HABITAT UNITS	DIFF INC (+) or DEC (-)
Dredge R1 to –3.5 ft NGVD	16.60	.50	8.30	16.60	.75	12.45	+ 4.15
Dredge R2 to –2.5 ft NGVD	12.10	.40	4.84	12.10	.50	6.05	+ 1.21
Dredge R1 & R2 - 3.5 ft & -2.5 ft	28.70	.45	12.91	28.70	.80	22.96	+10.05
Dredge R 2 THALWEG ONLY to -2.5 ft	3.60±	.40	1.44	3.60	.45	1.62	+ 0.18
R1 Dredged to -5.5 ft NGVD	16.60	.50	8.30	16.60	.82	13.61	+ 5.31
R2 Dredge to -4.5 ft NGVD	12.10	.40	4.84	12.10	.75	9.08*	+ 4.24-
R1 & R2 Dredged to –5.5 & -4.5 ft	28.70	.45	12.91	28.70	.87	24.96	+12.05
Widen NFHB Cross-Section	0.34±	.50	.17	.34	.55	.19*	+ .02*
Widen PTB Cross-Section	0.21±	.45	.09	.21	.50	.11*	+ .03
Widen NFHB & PTB Cross-Sect.	0.55	.55	.30	.55	.62	.34	.04
Create 1.5 ac Wetland in R1 (N FH)	1.50	.50	.75	1.50	.69	.1.04*	+ .29
Create 1.7 ac Wetland in R1 (PT)	1.70	.50	.85	1.70	.69	1.17	+ .32
Create 3.2 ac Wetland in R1 (NFH & PT)	3.20	.50	1.60	3.20	.75	2.40	+ .80
Remove.45 ac of Exotics in R1	.45	.15	.07*	.45	.55	.25*	+ .18
Remove .55 ac of Exotics in R2	.55	.15	.08	.55	.55	.30*	+ .22
Remove 1 ac of Exotics (R1[.45] R2 [.55]	1.00	.15	.15	1.00	.55	.55	.40

LEGEND:
R1 – Reach 1
R2 - Reach 2
NFHB – North Fort Harrison Bridge
PTB - Pinellas Trail Bridge
*--Figure Rounded

5.7.1 Detailed Disposal Comparisons

The Corps Study Team reviewed disposal alternatives for Stevenson Creek in order to minimize costs for the project.

The current commercial property just to the northeast of the creek project area was reviewed as to cost effectiveness of its use as a disposal site. First, the cost of material disposal without use of the commercial property was determined. The estimate was based on using an adjacent acceptable site of similar size. This estimate served as a "baseline" cost for the purpose of comparison and will be roughly equivalent to using a commercial property site. Next, the cost of disposal on the commercial property combined with the adjoining vacant acreage was calculated. This estimate was based upon an assumption that the commercial property is acceptable according to regulatory standards for dredged material disposal. Credit for Lands, Easements, Rights of Way, Relocations and Disposal (LERRD) can be afforded the sponsor if the sponsor provides such a site and the commercial property alternative proves to be the most cost-effective dredged material disposal measure. No funds can be used to clean HTRW sites as this responsibility rests with others. However, the Corps works with its sponsors to insure that, wherever possible, our civil works projects are compatible with and contribute to broader community cleanup and redevelopment initiatives under the Brownfield's program.

As detailed below, both the temporary dewatering site and the permanent disposal site that had been envisioned for use in the preliminary study did not prove feasible. Because of the highly urbanized character of the entire region, finding both a suitable temporary dewatering site and a permanent disposal site for the anticipated minimum 80,000 cubic yards of muck to be removed proved to be very difficult.

Temporary Dewatering Site: The preliminary study had envisioned use of two parcels contiguous to each other and adjacent to the creek. These parcels would have totaled ten acres that was considered to be the minimum needed to efficiently dewater the 80,000 cubic yards of muck. These two parcels included a 5-acre junkyard site and a 5-acre contiguous privately owned property referred to as the Wolfe property. However, during the preparation of this document, it was disclosed that slightly more than half of the Wolfe property consisted of very unique wetlands. In fact, the Florida DEP had contributed dollars to the City of Clearwater for preservation/study of this site and the City was able to use some of these funds for purchase of the property. The junkyard site has been in ongoing negotiations for some time and has yet to be purchased. The project site is within a designated Brownfield's area. Funds had also been received as part of this designation, some of which were used to conduct soils test of the junkyard to determine level of contamination. A DEP contracted report is not yet available,

however, all indications are that it is unlikely that a purchase of the property would be made prior to project construction. Together with the need for a buffer zone on the Wolfe property (to protect the wetlands), this has reduced the once available 10 acres to just slightly more than two acres. Also in joint field trip with DEP, they expressed a desire to retain an existing hardwood hammock located on the available 2 acres. Because it is located close to the road embankment this is feasible. After site work is completed on the temporary disposal site, the most available space is just less than two acres. This would mean that only a small berm could be used and a maximum height of only four to five feet of muck could be achieved. This translates into the need to shut down dredging operations for 2 to 3 months (depending on season) so as to wait for the material to dry enough to dispose at the permanent disposal site. It was calculated that it would take 2 to 3 years to complete this effort – a highly inefficient and costly operation.

Permanent Disposal Site: For this phase of the dredging operations the preliminary study had envisioned use of an existing landfill, known as Toytown that was recently closed down. The disposal would have been free of charge (i.e., no tipping fees). Toytown is located twenty miles from project site. However, during preparation of this ERR, the owners of the facility indicated that the future intended use of the property was to be a public golf course. Whereas chemical tests had shown that the muck was suitable for use in upland disposal sites, it was not acceptable on land that would be used by the general public for recreational purposes. As such this site would no longer be available and an alternate site was needed. The owners (County Utilities) offered their next closest existing landfill site which was still in use. Known as Bridgeway Acres, it was located close to Toytown and as long as the muck met their criteria and was in a dried state when disposed, they would accept the material for a tipping fee of $37.50 per ton. This added approximately $1.2 Million dollars to the government estimate and was not factored in the PRP. (A copy of the analysis is provided in Appendix A.)

The problems with both the temporary dewatering site and permanent disposal sites prompted the team to look at several different dredging/handling scenarios to accomplish the work. The following proved to be not feasible:

a. Use booster stations to pump hydraulically dredged material as far from the project site as feasible in order to increase likelihood of finding available open land suitable for temporary dewatering or permanent disposal. This did not prove workable since, beyond seven miles, the efficiency of the operation declined to a point where it was not worthwhile and within a seven-mile radius of this highly urbanized area no undeveloped property was available.

b. Pump or barge muck to ocean disposal. There is an existing permitted disposal site located within several miles offshore. This option was not pursued due to the difficulty of obtaining EPA approval for ocean disposal.

c. Two contractors proposed dredging techniques that employed differing polymers, conveyor belts and other material separation processes that they claimed would reduce dredging operations significantly. As far as disposal, contractors stated they could find a permanent disposal site but were not specific. Contractors seemed reluctant to provide sufficient detail to enable an adequate assessment by the team and these options were therefore not pursued. Not only would sufficient information be needed for assessment, but also enough information to place in final bid documents would be required to obtain open and fair competition during contract procurement.

5.7.2 Screening of Alternatives

Alternatives 3, 4, 5, 6 and 7 were eliminated because they failed to provide the necessary conveyance, environmental benefits, national ecosystem restoration contributions and/or exceeded project funding limits.

Widening the cross-section at both the North Fort Harrison Bridge and Pinellas Trail Bridges would only achieve nominal circulation improvements as determined in the hydrodynamic modeling conducted over a 14-day tidal cycle. Based on engineering judgment total costs associated with these alternatives could be prohibitive. This would include Alternatives 3-7.

5.8 SELECTING THE RECOMMENDED PLAN

The best plan in an environmental restoration project is the plan that meets the same general optimization criterion as in a traditional water resources development project whose primary or sole purpose is not environmental restoration. That criterion is maximization of net benefits. The alternative that maximizes net benefits is the alternative for which the difference between monetary and non-monetary costs and benefits is greater than for any other alternative. Benefits and costs for an alternative are the estimated differences between relevant conditions with and without the alternative.

For this restoration project, all benefits are non-monetary environmental improvement benefits that contribute to national ecosystem restoration goals. Habitat Units (HU's) are a means by which environmental scientists quantify the additional environmental output created annually. The Habitat Units were calculated in-house for this project with concurrence from an interagency group of peers. Costs are the monetary costs of implementation and operation, maintenance, repair, replacement, and rehabilitation (OMRR&R). The recommended plan was carefully designed and formulated by a focused interdisciplinary team of professional planners, engineers, and scientists. It is a relatively straightforward, simple plan to remove muck in Stevenson Creek between North Fort Harris Bridge and Douglas Ave. Bridge, and create two

mangrove shelves totaling 3.2 acres with 1 acre of exotic plant control, thereby re-establishing habitat that was lost due to sediment build-up and nutrient loading.

In a cost effectiveness analysis, the goal is to filter out plans that produce the same output level as another plan, but cost more; or cost either the same amount or more than another plan, but produces less output. The plans are listed in order of increasing output; this imposes order and facilitates cost effectiveness analyses.

Chart 1

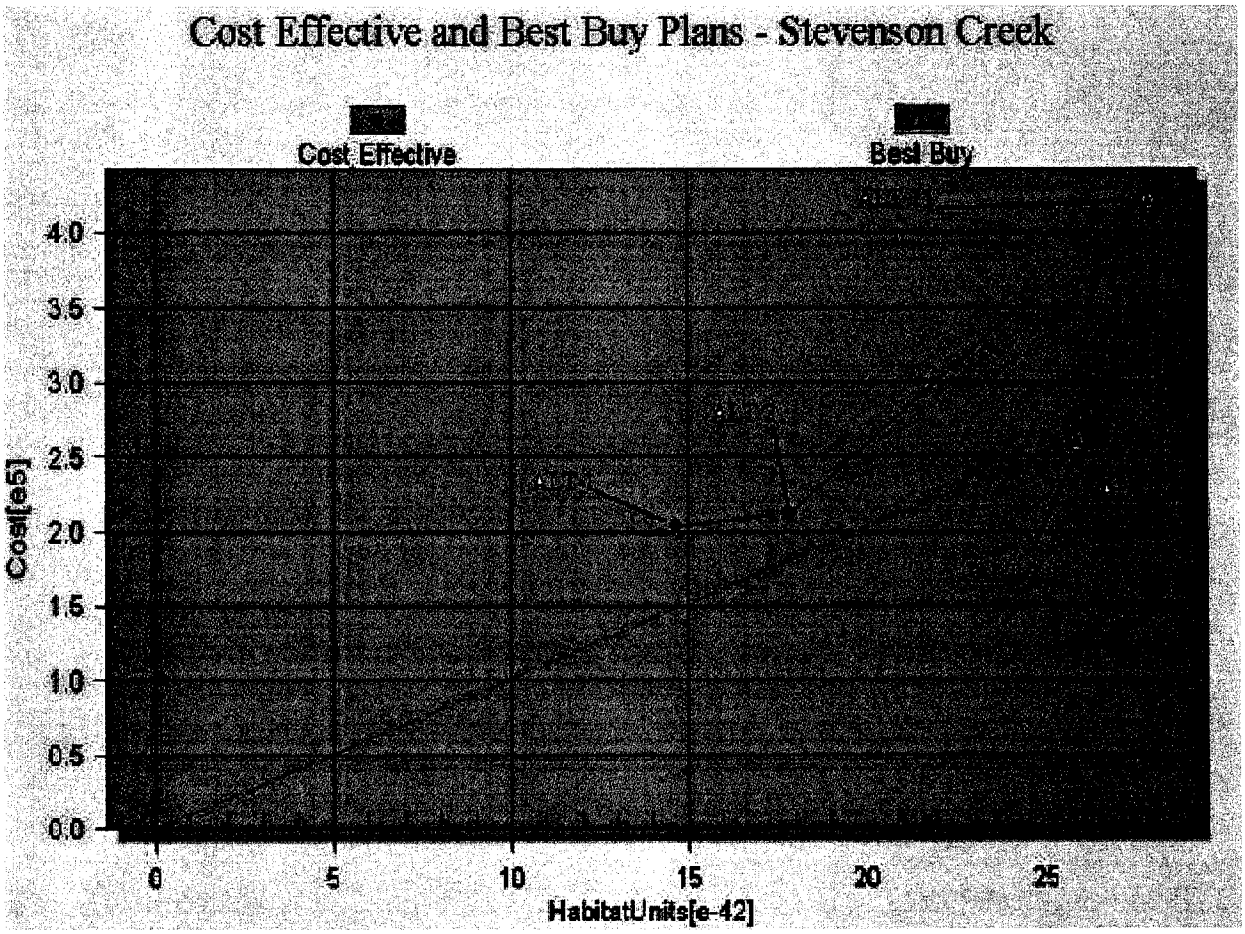
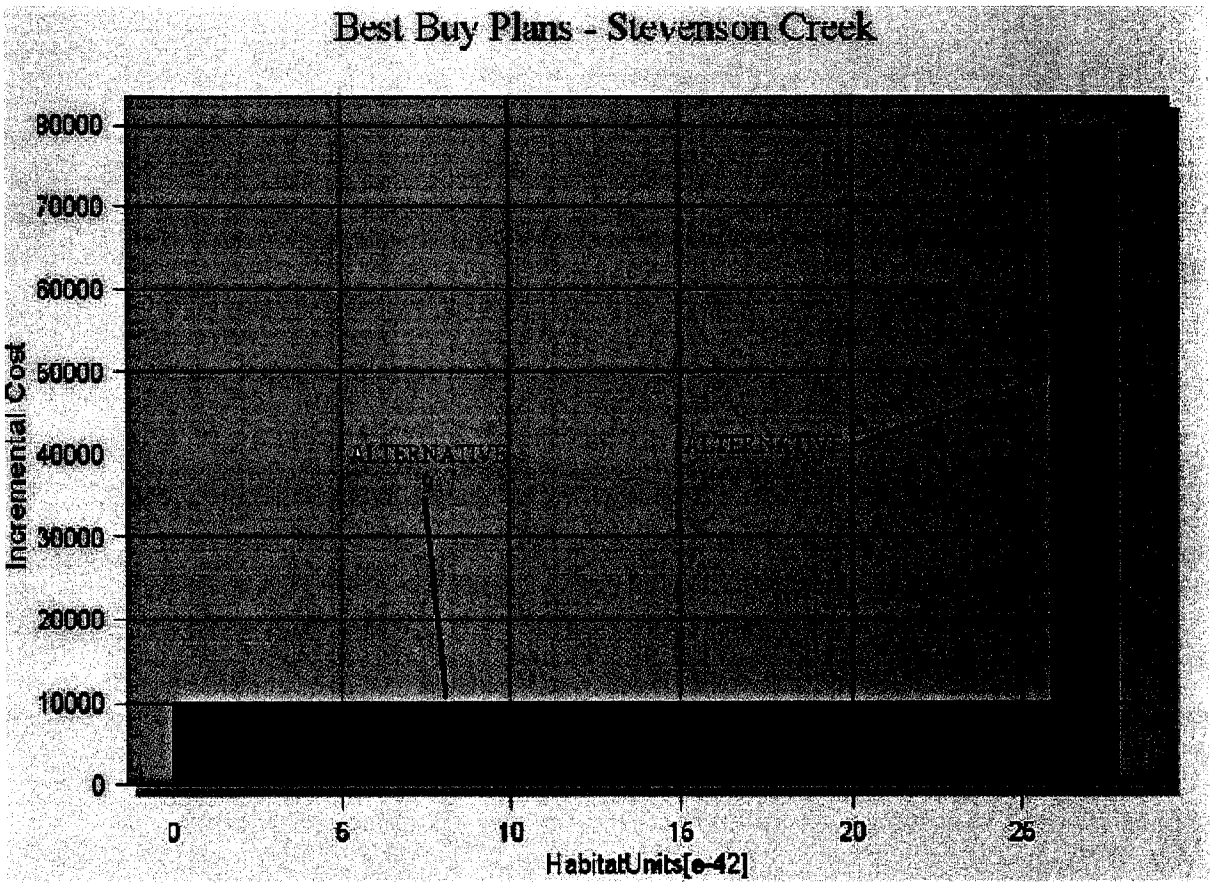


Chart 2



Engineering Regulation (ER) 1105-2-100 (The Planning Guidance Notebook), dated 22 April 2000, provides economic evaluation procedures to be used in all Federal water resources planning studies. The guidelines specified were observed in preparing this report. The Federally mandated project evaluation interest rate of 5.875 percent, an economic period of analysis of 50 years and 2003 prices were used to evaluate economic feasibility.

The main issues requiring economic evaluation attention include equivalent time basis calculations, price levels, timing of project spending, and computation of average cost. The timing of a plan's cost is important. Construction and other initial implementation costs cannot simply be added to periodically recurring costs for project operation, maintenance and monitoring. Also, construction costs incurred in a given year of the project can't simply be added to construction costs incurred in other years if meaningful and direct comparisons of the costs of the different alternatives are to be made. A common practice of equating sums of money across time with their equivalent at an earlier single point in time is the process known as discounting. Through this mathematical process, which involves the use of an interest rate (or discount rate) officially prescribed by Federal policy for use in water resources planning analysis (currently set at

5.875% per year), the cost time streams of each alternative are mathematically translated into equivalent time basis value.

ER 1105-2-100 requires that interest during construction (IDC) be computed, which represents the opportunity cost of capital incurred during the construction period. Interest was computed for construction costs from the middle of the month in with expenditures were incurred until the first of the month following the estimated 6-month construction period. The cost of a project is the investment incurred up to the beginning of the period of analysis. The investment cost at the time is the sum of construction cost plus interest during construction. Table 11 summarizes the total investment cost and total annual equivalent costs for each alternative.

Table 5. Total Investment Cost and Total Annual Equivalent Costs											
Summary of Costs	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7	Alt 9	Alt 10	Alt 11	Alt 12
Construction	$2,812,800	$2,942,613	$5,721,555	$5,847,110	$6,194,846	$6,945,866	$6,892,741	$3,722,754	$3,542,402	$6,208,911	$6,214,067
Interest during Construction	$81,837	$85,614	$166,466	$170,119	$180,236	$202,087	$200,541	$108,312	$103,065	$180,645	$180,795
Real Estate	$366,000	$366,000	$366,000	$366,000	$366,000	$366,000	$366,000	$366,000	$366,000	$366,000	$366,000
Total Investment	$3,260,637	$3,394,227	$6,254,021	$6,383,229	$6,741,082	$7,513,953	$7,459,282	$4,197,066	$4,011,467	$6,755,556	$6,760,862
Annual Cost											
Interest and Amortization	$203,268	$211,596	$389,876	$397,931	$420,239	$468,420	$465,012	$261,645	$250,075	$421,141	$421,472
O&M Costs	$6,321	$4,678	$6,321	$4,678	$4,678	$1,056	$1,056	$1,056	$942	$942	$942
Total Annual Cost	$209,589	$216,274	$396,197	$402,609	$424,917	$469,476	$466,068	$262,701	$251,017	$422,083	$422,414

Assumptions:

Construction cost evenly distributed over 12 months.

O&M costs are based on a shoaling rate of 200 cubic yds. per year.

*Estimated cost of water quality certification is $25,000.

*The cost of additional sediment tests during permitting and construction is approximately $50,000.

Table 6. Cost and Habitat Unit (HU) Value Output of Alternatives For Cost Effective Plans

Alternative	Annual Cost	Total Output (HU)	Cost/Output	Acres Created/ Restored	Annual Cost Per Acre
1	$209,589	14.66	$14,297	18.55	11,298
2	$216,274	17.88	$12,096	24.40	8,863
9	$262,701	25.91	$10,139	32.90	7,984
11	$422,083	27.62	$15,282	32.35	13,047
12	$422,414	27.92	$15,129	32.90	12,839

Table 7. Incremental Cost of Best Buy Plan Combinations

Alternative	Habitat Units	Annual Cost	Annual Avg. Cost	Inc. Cost	Inc. Output	Inc. Cost Per Output
Alt. 9	25.91	261,645	10,098	261,645	25.91	10,098
Alt. 12	27.92	421,472	15,095	159,827	2.01	79,515

The incremental analysis determines both cost effective plans and "Best Buy" plans. Alternatives 1, 2, 9, 11 and 12 were the cost effective plans (see Chart 1). Alternatives 1 and 2 were not considered further due to their limited contributions to the overall project objectives. In particular, Alternatives 1 and 2 do not restore the historic benthic bottom throughout Reach 1 and Reach 2. This would cause increased O&M costs, limit navigation, the odor problem would still persist, pollutants and contaminants would still remain in undredged areas and could therefore redistribute and become suspended, and water quality issues would still be of concern. These alternatives would also only allow manatee access into Reach 1, which is not far enough to benefit from the freshwater source from the wastewater treatment plant and creek upstream. Environmental analysis conducted by Dial Cordy (2002) indicated limited to no aquatic improvement from dredging of only the thalweg area in R2. Alternative 1 and 2 do not meet the evaluation criteria of acceptability, completeness, effectiveness, or efficiency. Alternative 11 is identical to Alternative 12 except that Alternative 11 only has .45 acres of exotic plant removal and Alternative 12 has a full acre of exotic plant removal. Costs per habitat unit are higher in Alternative 11, annual costs per acre are higher than Alternative 12 and less total habitat units are provided (see Chart 2). In response to the evaluation criteria, Alternative 11 is considered only partially acceptable, partially complete and partially efficient. Therefore Alternative 12 is clearly a better plan than Alternative 11.

Alternative 9 and 12 were indicated to be the "Best Buy" plans (see Chart 2). Alternative 9 produces 25.91 habitat units at a cost/output of $10,139. Alternative 12 produces 27.92 habitat units at a cost/output of $15,129 (see Table 12). Although Alternative 9 has a lower cost/output, Alternative 12 produces more habitat units. Alternative 9 is a good plan but does not meet all of the objectives or evaluation criteria. Alternative 9 is considered not fully acceptable, partially

complete, partially effective and is the second most efficient plan (see Table 2.) Alternative 9 does not remove all of the sediment build-up present and at a dredged depth of –4.5 NGVD in Reach 1 and –3.5 NGVD in Reach 2, will not create the necessary depth to allow manatee access into Reach 2.

Hydrodynamic modeling indicated the proposed alternatives did not have a noticeable change in surface water elevations during high tide cycles. Noticeable changes in surface water elevations were during the lower low water tide cycles. Elevations ranged from 0.05 to 0.65 feet below existing conditions. Overall, tidal characteristics were evident with dredging of the entire area of Reach 1 (NFH) and Reach 2 (PT and DA). Velocity magnitude changes (ebb and flood) were evident with Alternative 9. The hydrodynamic modeling results also indicated the more efficient Alternative would be 9. A more efficient tidal circulation and exchange would be achieved, in addition to, enhancing flood conveyance 35 to 40 percent. No negative hydrodynamic impacts were identified with inclusion of a mangrove shelf at elevation 1.0-foot NGVD. (See the Hydrodynamic Model Alternative Assessment in Appendix B, specifically Tables 8, 9, and 10). Hydraulic modeling determined that Alternative 9 provided the greatest improvement to circulation and Alternative 12 was not modeled due to availability of funding and time constraints. However, based on engineering judgment, it is believed that flushing would only be improved by removing the muck to a deeper depth.

The optimal alternative components would have the capacity to restore the biological, ecological, chemical, and physical components necessary to achieve a self- sustaining estuary. Restoring these components would increase fish and wildlife utilization, provide habitat, and increase velocity/flow conveyance. Secondary components would improve water quality, eliminate a source of air pollution, and provide flooding relief, in addition to, removing a source of sedimentation to seagrasses established in the adjoining waters of Clearwater Harbor. Other beneficial components of dredging with habitat creation would provide refugia for juvenile shrimps and snook, detritus for the aquatic food web, favorable substrate for the recruitment of benthos and fauna.

An interdisciplinary team of scientists, planners, and engineers analyzed the results and concluded that Alternative 12, which includes the muck removal in Reach 1 to –5.5 NGVD and Reach 2 to –4.5 NGVD in entirety, as well as the creation of a 3.2 acres of mangrove shelves plus 1 acre of exotic plant control, is the optimal environmental plan for Stevenson Creek. Alternative 12 is the only one that meets **all** eight objectives of this project and all four evaluation criteria. The most important feature of this plan that differentiates it from Alternative 9 was the fact that it would be self-maintaining for the project life, have minimal to no anticipated O & M costs, remove all of the sediment accumulation there by ensuring, long lasting improved water quality, odor elimination, maximize navigation opportunities, remove all possible HTRW contaminants and provide a

safe harbor, foraging, resting, freshwater access and possible thermal benefits to the West Indian Manatee.

Stevenson Creek is a Brownfields area and Environmental Justice site that is completely urbanized. Under Executive Order 12898: Env. Justice for Minority Populations Section 1-1. Implementation. 1-101. Agency Responsibilities. To the greatest extent practicable and permitted by law, and consistent with the principles se forth in the report on the national Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories. The City of Clearwater has identified the restoration of Stevenson Creek to be their number one environmental justice issue. EPA Brownfield's Economic Redevelopment initiative is designed to empower states, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse Brownfield's. A Brownfield is a site, or portion thereof, that has actual or perceived contamination and an active potential for redevelopment or reuse. The City of Clearwater has suffered from private sector disinvestments combined with environmental decline. The past decade, in particular, has been characterized by both business and job losses. These economic changes have hit central Clearwater's North and South Greenwood neighborhoods hardest. As part of Clearwater Brownfield's Area (CBA), which covers 1,842 acres, the Brownfield's Cleanup Revolving Loan Fund (BCRLF) will target cleanup and revitalization of North and South Greenwood communities and portions of the downtown business district. In this area, nearly 26 percent of the residents live below the poverty level and almost 10 percent are unemployed. There are approximately 200 potentially contaminated sites in the CBA, and the area is a State-designated Enterprise Zone, a Neighborhood Revitalization Strategy Area, A Brownfield's Assessment Pilot, a State-designated Brownfield's Area, and a U.S. Department of Justice Weed ad Seed site. These important and special designations contributed strongly to the selection of Alternative 12 over Alternative 9.

Alternative 12 meets the four screening criteria of acceptability, completeness, effectiveness, efficiency (see Table 2 Plan Comparison) and is selected as the recommended plan. It reasonably maximizes ecosystem restoration benefits compared to costs, it is consistent with the Federal objective, cost effective and will achieve the desired level of output. The USACE received a letter on 14 May 2003 from Mr. Robert Bonde, a Biologist with the U. S. Geological Survey. In his letter, he summarizes that the concept of using this project to help develop habitat for manatees is wise. Mr. Bonde said, "Manatees in northern Florida are presently being subjected to deregulation pressures of the power industry. The direct effect of that reduction in operation of previously reliable sites might mean that future artificial warm water sites are not available to meet their basic temperature needs. If this is the case, and manatees are to remain in this region of

the state, then any effort to enhance natural habitat areas like this one will be helpful in insuring the future of manatees in Florida." Another important consideration was the urbanization of the area, (the watershed is 6300 acres and 95% developed). The team believed that it was important to restore Stevenson Creek to the greatest level possible and maximize environmental/restoration benefits where possible. The lack of available land was a critical issue in securing a temporary disposal and permanent disposal site and in selecting Alternative 12. Stevenson Creek flows into Clearwater Harbor, which is an Outstanding Florida Water and part of the Pinellas Aquatic Preserve. This designation also led the team to support alternative 12 over 9. Alternative 12 is also determined to be the environmentally preferred plan, as well as the preferred plan of the sponsor (see pertinent correspondence)."

6 ENVIRONMENTAL CONSIDERATIONS

6.1 Fish and Wildlife Resources

The recommended plan would benefit fish and wildlife resources throughout the Stevenson Creek Estuary. Increase flow and conveyance would be provided after sediments are removed from the estuary. Benthic levels with fish and wildlife values would benefit. Juvenile and adult species that spend their life cycle in the estuary will receive increased habitat and cover areas from the planting of mangroves.

6.2 Water Quality

Water quality is a major component of the project. Water quality improvements can be obtained in the receiving waters of Stevenson Creek and Charlotte harbor. The City of Clearwater also has watershed improvement projects to begin in 2005. These improvements will enhance and support the Stevenson Creek Estuary project. The State of Florida Water Quality Certificate conditions would be met during construction of the project.

6.3 Threatened and Endangered Species

The federally listed species found in the estuary is the West Indian manatee. The project proposes no adverse impact to the species or adverse habitat modifications. Standard protection guidelines will be employed to ensure no adverse impacts occur to the species. The recommended project creates and improves habitat for manatees. Currently, the existing depths are not adequate for the manatee to navigate. This project will deepen the waterway from bank to bank to allow manatees access to the freshwater source at the treatment plant. The creation of the two mangrove islands would also provide an additional food source. Manatees in northern Florida are presently being subjected to deregulation pressures of the power industry. The direct effect of that reduction in operation of previously reliable sites might mean that future artificial warm water sites are not available to meet their basic temperature needs. If this is the case, and manatees are to remain in this region of the state, then any effort to

enhance natural habitat areas like Stevenson Creek will be helpful in insuring the future of manatees in Florida.

6.4 Cultural Resources

Remote Sensing and Diver Evaluation investigations have been completed for the Stevenson Creek estuary. No significant cultural resources were identified. Results of the survey have been coordinated with the State Historic Preservation Office.

6.5 Hazardous and Toxic Wastes (HTRW)

Metal concentrates do not reach the hazardous level, but levels are such that dredged material must meet all regulatory thresholds before material disposal at the proposed site. Test results indicated a high concentration of cadium, chromium, copper, lead, and iron. However, the concentrations of chemicals detected are below the threshold, which would be considered contaminants. This project would remove all of the sediment build-up with Reach 1 and Reach 2, thereby removing the high levels of chemicals present.

6.6 Environmental Assessment

A draft Environmental Assessment (EA) was prepared by the Corps and is included in Appendix D of this report. The draft EA meets the requirements meets the requirements of the National Environmental Policy Act.

TABLE 8
WILDLIFE OBSERVED OR EXPECTED WITHIN STEVENSON CREEK WATERSHED

Wildlife Observed (*) or Expected Within the Stevenson Creek Watershed	
Scientific Name	**Common Name**
Mammals	
Dasypus novemcinctus	Armadillo
Didelphis virginiana	Opossum
Peromyscus gossypinus	Cotton mouse
Peromyscus polionotus	Oldfield mouse
Procyon lotor	Raccoon
Sciurus carolinensis	Eastern gray squirrel
Sigmodon hispidus	Hispid cotton rat
Sylvilagus floridanus	Eastern cottontail
Reptiles And Amphibians	
Anolis carolinensis	Green anole
Anolis sagrei sagrei	Brown anole
Acris gryllus	Southern cricket frog
Bufo terrestris	Southern toad
Coluber constrictor	Black racer
Diadophis punctatus	Ring necked snake
Hyla gratiosa	Barking tree frog
Hyla squirella	Squirrel tree frog
Osteopilus septentrionalis	Cuban treefrog
Rana sphenocephala	Southern leopard frog
Trachemys scripta elegans	Red-eared turtle
Trachemys scripta scripta	Yellow bellied turtle
Thamnophis sirtalis	Common garter snake
Fish	
Centropanus undecimalus	Snook
Gambusia sp.	Mosquito fish
Lagodon rhomboides	Pinfish
Mugil cephalus	Mullet
Orthopristis chrysoptera	Pigfish
Scizenops ocellatus	Red fish

Source: Field observations (Parsons ES, May 2000), and Florida Natural Areas Inventory, 1996.

TABLE 8
WILDLIFE OBSERVED OR EXPECTED WITHIN STEVENS9ON CREEK WATERSHED

Wildlife Observed (*) or Expected Within the Stevenson Creek Watershed	
Scientific Name	**Common Name**
Birds	
Agelaius phoeniceus	Red-winged blackbird
*Anhinga anhinga**	Anhinga
Ardea herodias	Great blue heron
*Bubulcus ibis**	Cattle egret
Cardinalis cardinalis	Cardinal
*Casmerodius albus**	Great egret
Cathartes aura	Turkey vulture
Colaptes auratus	Northern flicker
Columba livia	Rock dove
Coragyps atratus	Black vulture
Corvus ossifragus	Fish crow
*Cyanocitta cristata**	Blue jay
Dendroica palmarum	Palm warbler
Dumetella carolinensis	Catbird
*Egretta caerula**	Little blue heron
Egretta thula	Snowy egret
*Eudocimus albus**	White ibis
Geothlypis trichas	Common yellowthroat
Melanerpes carolinus	Red-bellied woodpecker
Mimus polyglottus	Mocking bird
Pandion haliaetus	Osprey
Passer domesticus	House sparrow
Parus bicolor	Tufted titmouse
Pelecanus occidentalis	Brown pelican
Phalacrocorax Auritus	Double-crested cormorant
Picoides Pubescens	Downy woodpecker
Plegadis Falcinellus	Glossy ibis
*Quiscalus quiscula**	Common grackle
Sturnus vulgarus	European starling
Strix varia	Barred owl
Thryothorus ludovicianus	Carolina wren
*Zenaida macroura**	Mourning dove

SOURCE: PARSON ENGINEERING

7 SELECTED PLAN

The "Best Buy" plan the team recommends is Alternative 12 because its features include: Reach 1 and Reach 2 will be dredged in entirety to –5.5 NGVD and –4.5 NGVD respectively, 3.2 acres of mangrove shelves will be created and 1 acre of exotic plant management will occur (See figure 5). Alternative 12 will restore the historic benthic substrate, eliminate odor pollution problems, increase flow/tidal flushing, increase fish and shellfish populations, increase bird habitat and populations, improve recreational opportunities, create manatee habitat and remove nuisance exotic plants. Alternative 12 provides the greatest number of habitat units. The habitat units were coordinated with the National Marine Fisheries Service (also known as NOAA) and a copy was provided to the USFWS for comments. Alternative 12 was also determined to be the USACE environmentally preferred plan, the preferred plan of the U.S. Geological Survey, as well as the preferred plan of the sponsor.

The recommended plan, alternative 12 proposes dredging within Reach 1 to –5.5 NGVD which will remove 111,000 cubic yards of muck and dredging within Reach 2 to –4.5 NGVD which will remove 86,300 cubic yards of muck and sand. This plan also creates a 1.5 acre mangrove shelf along the southwest shoreline and a 1.7 acre mangrove shelf along the southeast shoreline at elevation 1.0 foot NGVD. The mangrove shelves will be planted with red or black mangroves. One acre of exotic plant management of Australian pine and Brazilian pepper will occur in Reach 1 and Reach 2 combined. This alternative would increase flushing and circulation, water quality, and increase wildlife values. This alternative would provide 27.92 habitat units. This restoration effort would have components which achieve a self sustaining estuary, restore and increase fish and wildlife species utilization, provide habitat creation, increases flow conveyance/velocity, and contain secondary components that eliminate sources of air pollution, provide flooding relief, and water quality improvements within the estuary without any long-term adverse impacts to the aquatic environment.

On site hydrocyclone processing of dredged material would take place at the proposed temporary dewatering area on the Wolfe property (see figure 3). Sand secured from this process would be used for the creation of the mangrove shelves and the muck material would be pumped into geotechnical bags for drying. Once dried, the material would be transported to a permanent disposal site located about 20 miles away in Hillsborough County (see figure 4).

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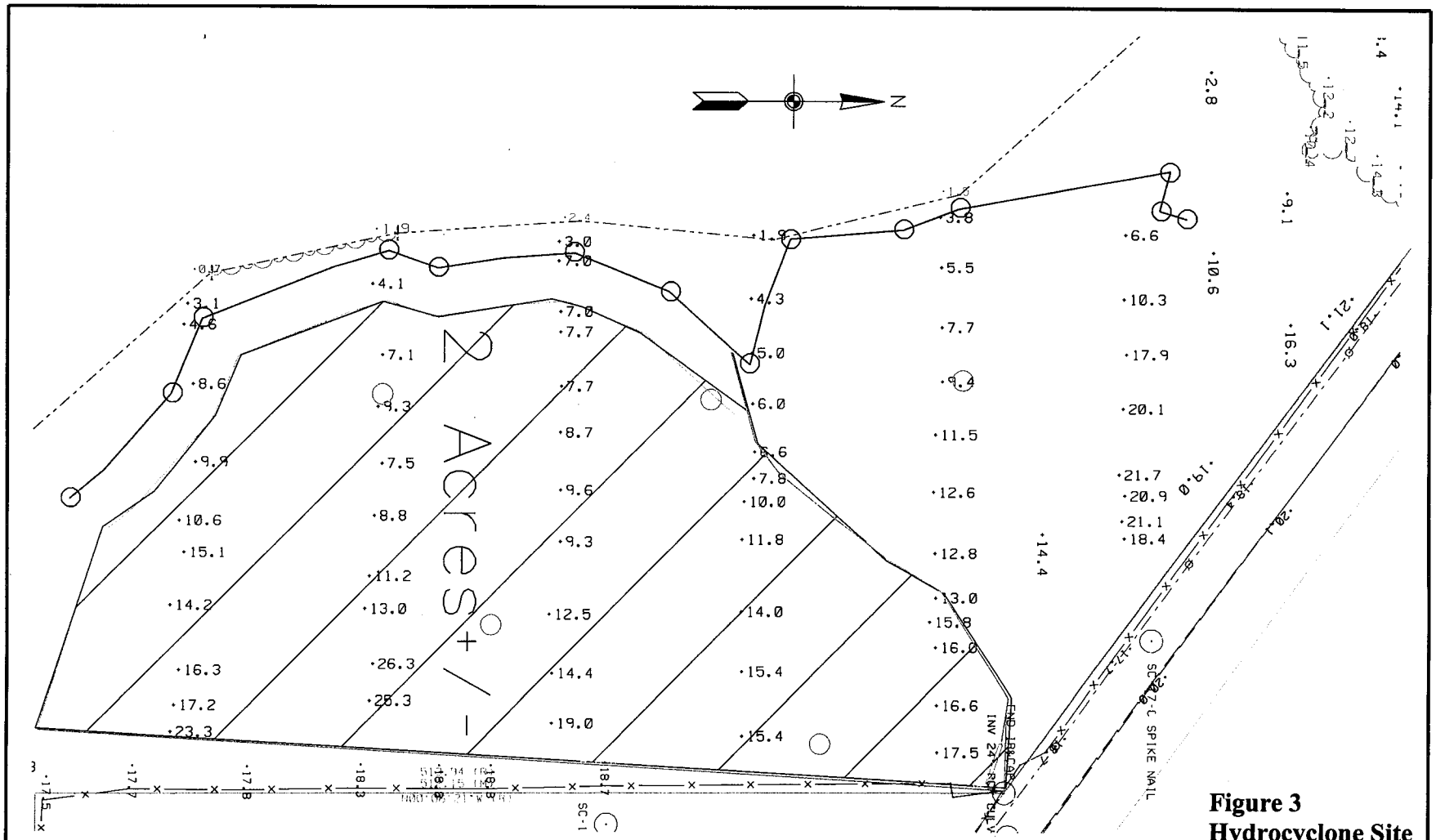

Figure 3
Hydrocyclone Site

PLATE 6	STEVENSON CREEK - CLEARWATER, FLORIDA HYDROCYCLONE AREA ENGINEERING APPENDIX	File name: Reference files:	Designed by: R.E.H. Drwn by: R.E.H. Ckd by: Dated:	Scale: AS SHOWN Plot date: JUNE 13, 2002 Plot scale:	DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA US Army Corps of Engineers Jacksonville District

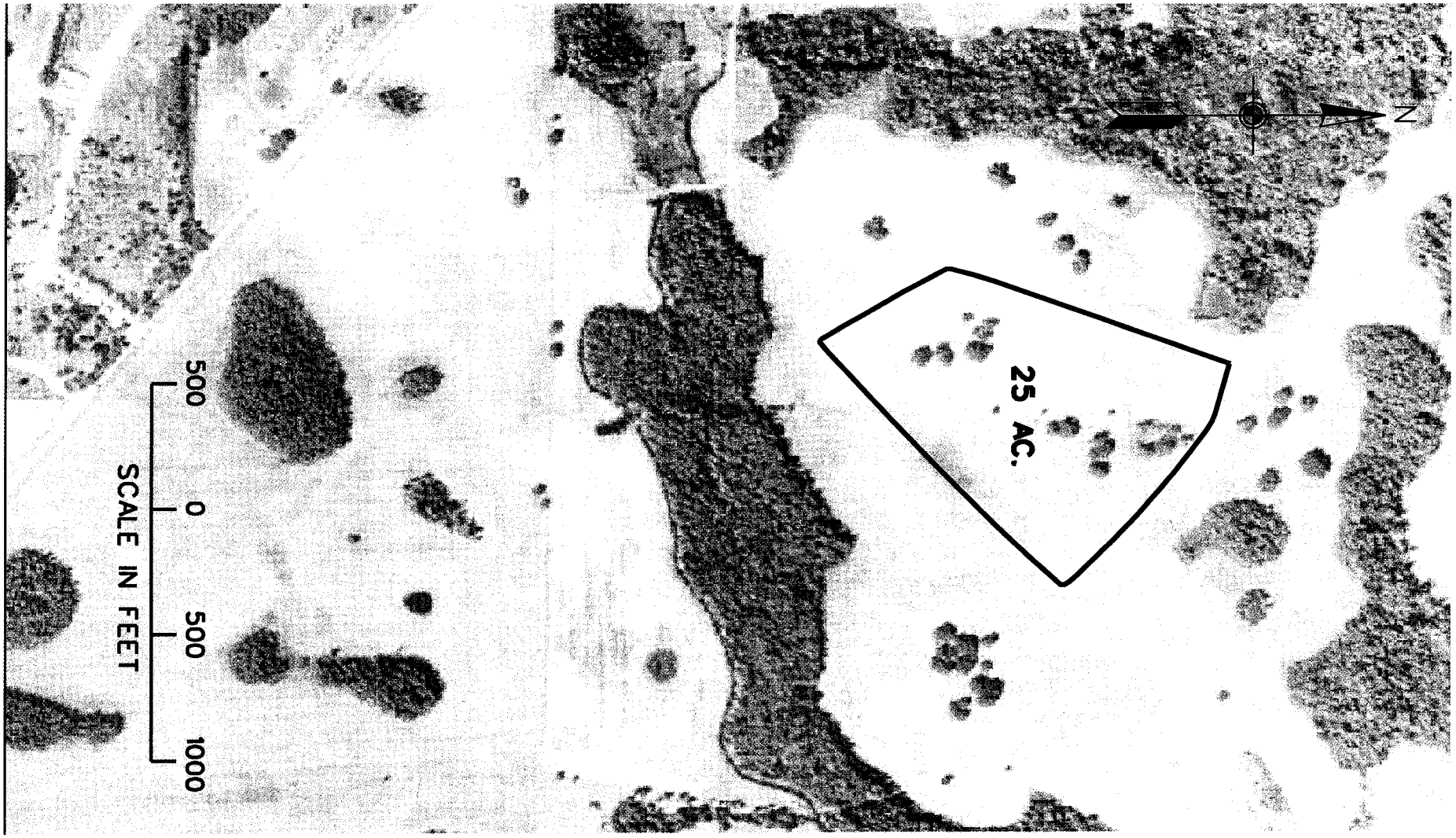

FIGURE 4

STEVENSON CREEK - CLEARWATER, FLORIDA

PERMANENT DISPOSAL AREA

SECTION 206 - ENVIRONMENTAL RESTORATION REPORT (ERR)

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Reference files:	Drwn by: R.E.M. / Ckd by:	Plot date: JANUARY 28, 2003	
	Dated:	Plot scale:	

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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

US Army Corps of Engineers
Jacksonville District

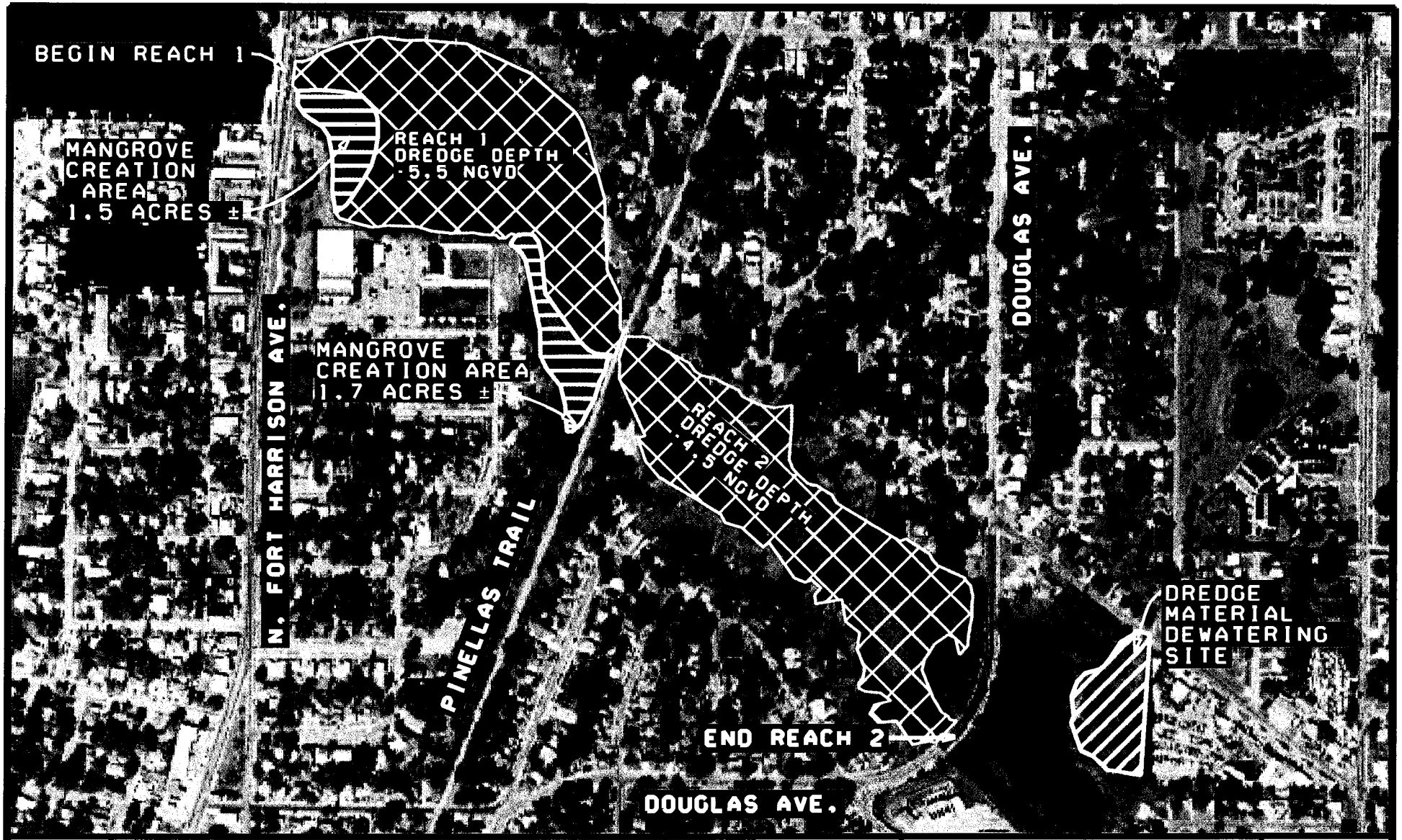

FIGURE 5

STEVENSON CREEK - CLEARWATER, FLORIDA

RECOMMENDED PLAN

ENGINEERING APPENDIX

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Reference files:	Drn by: J.W.M. / Ckd by: J.W.M.	Plot date: Jan. 27, 2003	
	Dated:	Plot scale: 1"=500'	

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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

US Army Corps of Engineers
Jacksonville District

7.1 PLAN COSTS

A standard U.S. Army Corps of Engineers computer program, M-CACES, was used to calculate the construction cost estimate for the proposed Stevenson Creek Ecosystem Restoration Project, see Appendix C and Table 5. The related non-construction costs of permit acquisition, design, bid process, associated surveys, and project management. The current estimated cost of construction can be found in Tables 9, 10 and 11. The current estimated costs of construction and non-construction activities for Reach 1 are found in Table 9 and for Reach 2 in Table 10. Table 11 has the total project construction and non-construction costs for both Reaches.

Table 9. Construction and Non-Construction Cost Estimate for Reach 1 (Main Estuary)

Construction Costs	Quantity	Unit	Sub-Total	Contingency	Total Cost
Mobil, Demobil & Prep Work					
Total Mobil, Demob & Prep			127,064	31,766	158,830
Pipeline Dredging					
MUDCAT 8" Port. Pipeline Dredge	111,000	CY	345,968	86,492	432,460
Disposal Area (2 Acre Site)					
Clearing & Grubbing	2.00	AC	2,210	552	2,762
Grading & Berm Construction	2.00	AC	67,897	13,579	81,477
Drainage Ditch to Creek	1,000	LF	6,102	1,526	7,628
Drainage Weir to Creek			33,602	6,720	40,322
Associated General Items					
TOTAL Associated General Items			1,822,225	455,556	2,277,782
TOTAL Construction Costs R1			2,405,069	596,192	3,001,262
Non-Construction Costs					
Plans & Specifications			192,406	48,101	240,507
Construction Management (S&I)			240,507	60,127	300,634
TOTAL Non-Construction Cost			432,912	108,228	541,141
TOTAL Final Plan Reach 1			2,837,982	704,420	3,542,402

Table 10. Construction and Non-Construction Cost Estimate for Reach 2 (Upper Reach)

Construction Costs	Quantity	Unit	Sub-Total	Contingency	Total Cost
Mobil, Demobil & Prep Work					
Pipeline Dredge Mob/Demob & Prep			4,287	1,072	5,359
Pipeline Dredging					
MUDCAT 8" Port. Pipeline Dredge			268,982	67,246	336,228
Associated General Items					
TOTAL Associated General Items			$1,538,029	$384,507	$1,922,536
Total Construction Costs R2			$1,811,298	$452,825	2,264,123
Non Construction Costs					
Planning, Engineering & Design			144,904	36,226	181,130
Construction Management (S&I)			181,130	45,282	226,412
Total Non-Construction Cost			326,034	81,508	407,542
TOTAL Final Plan Reach 2			2,137,332	534,333	2,671,665

Table 11. Total Project Construction and Non-Construction Cost Estimate

Construction Costs	Total Cost
Construction Costs Reach 1	3,001,262
Construction Costs Reach 2	2,264,123
Total Project Construction Costs	5,265,385
Non-Construction Costs	
Non-Construction Reach 1	541,141
Non-Construction Reach 2	407,542
Total Project Non-Construction Costs	948,683
TOTAL PROJECT	6,214,067

8 PLAN IMPLEMENTATION

8.1 Non-Federal Responsibilities

The responsibilities of the non-Federal sponsor include, but are not limited to, the following:

a. Pay 100 percent of any operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs attributable to the Ecosystem Restoration. Stevenson Creek itself is expected to be self-sustaining after the restoration actions are complete, and no costs are expected. The temporary dewatering area along the northern bank of Stevenson Creek would be restored once the dredged material is transported to a permanent disposal site. The restored site would require periodic monitoring for Australian pine and Brazilian pepper, and removal of these species if they become established.

b. Provide all lands, easements, rights-of-way, borrow areas, and dredged material disposal areas; perform all relocations determined by the Government to be necessary for the Ecosystem Restoration; and provide evidence to support the Local Sponsor's legal authority to grant rights-of-entry to such lands. The necessary lands, easements and rights-of-way determined by the Government to be necessary for work to be performed under a construction contract must be furnished prior to the advertisement of the construction contract.

c. Provide or pay to the Government the cost of providing all retaining dikes, weirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged material disposal area necessary for the Ecosystem Restoration.

d. Comply with applicable provisions of the Uniform Relocation Assistance and Real Property Acquisitions Policies Act of 1970, Public Law 91-66, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Act 100-7); the Uniform Regulations contained in 9 CFR Part 2, in acquiring lands, easement, and rights-of-way for construction and subsequent operation and maintenance of the Ecosystem Restoration; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

e. Provide, during the period of implementation, cash payments to meet its obligations under Article II of the Project Cooperation Agreement (PCA). Study cost and Plans and Specification costs will be funded up front by the Federal Government. Total Ecosystem Restoration costs will be reapportioned during the implementation period to meet the cost-sharing requirements.

8.2 Federal Responsibility

The Federal share is estimated at $4,784,642 or 65% of the total project costs. Federal funding is subject to budgetary constraints inherent in the formulation of a national Civil Works budget for a given Fiscal Year. The Corps would perform the necessary pre-construction, engineering, and design required prior to construction. The Corps will also obtain the water quality certification, advertise, award, and construct this restoration project.

8.3 Real Estate Requirements

The non-Federal sponsor, City of Clearwater, owns all uplands required to support construction of the proposed project. Total Estimated Real Estate costs are $366,000. The non-Federal credit is estimated at $350,000. The value and amount, of credit given for LERRD required will be determined by the Real Estate Division as stated in ER-1105-2-100, Appendix F.

8.4 Work-In-Kind

The non-Federal sponsor does not expect to provide in-kind services at this time.

8.5 Cost Sharing

Authority for the items of local cooperation and provisions of the Project Cooperation Agreement (PCA) is provided by Section 206 of the Water Resources Development Act of 1996, as amended. This project will be constructed solely for the purpose of aquatic ecosystem restoration in Stevenson Creek. On this basis, the Federal Government would bear 65 percent of the total habitat improvement costs at Stevenson Creek and the local sponsor would bear 35 percent. The total project cost estimate, ($7,360,987), includes cost of the feasibility study, engineering and design, plans and specifications, LERRD and construction. The Federal portion of the project cost is estimated to be ($4,784,642) and the non-Federal share is estimated to be
($2,576,345), Table 12 shows a simple partitioning of each of the costs.

Table 12. Project Cost Sharing.

Item	Total Cost	Federal Share	Non-Federal Share
Study	780,920	780,920	0
Lands, Easements, Right of way, Relocations and Disposal areas (LERRD)	366,000	16,000	350,000
Construction & Non-Construction	6,214,067	3,987,721	2,226,345
Total Project Costs	**$7,360,987**	**$4,784,642**	**$2,576,345**

The Environmental Restoration Report and Plans and Specifications are initially Federally financed, and costs distributed as part of the Non-Federal share of project costs during implementation. The sponsor (City of Clearwater) requirements are indicated in Table 12. The sponsor will provide all LERRD required for the project. The remaining portion of the sponsor's share will be comprised of work-in-kind and cash. The sponsor would be required to maintain the project after construction.

Table 13. Non-Federal Responsibility.

ITEM	COST
LERRD	$350,000
Cash	$2,226,345
Work-in-kind	$0
Annual OMRR+R	$942

8.6 Project Cooperation Agreement (PCA)

The description of the Federal and non-Federal responsibilities will be legally defined in the project cooperation agreement. The Recommendations section of this report describes the items of local cooperation that the non-Federal sponsor will be required to furnish.

PCA negotiations with the non-Federal project sponsor will be conducted, and a draft PCA will be submitted to the Corps of Engineers, South Atlantic Division, for review and approval. No deviations from the model PCA agreement are anticipated. Once the PCA has been approved, design will be initiated and construction funds will be budgeted.

8.7 Sponsor Views

The City of Clearwater supports the project, as noted in the letter of intent, see Enclosure 1.

9 SUMMARY OF COORDINATION, PUBLIC VIEWS, AND COMMENTS

The Jacksonville District has been a regular participant in the periodic Stevenson Creek Task Force meetings. Membership in the Task Force includes the City of Clearwater, Pinellas County, Southwest Florida Water Management District, and the Florida Department of Environmental Protection.

The Jacksonville District and the City of Clearwater (Non-Federal sponsor) have been in close coordination during the preparation of the ERR.

10 RECOMMENDATIONS

I have weighed the accomplishments to be obtained from the proposed ecosystem restoration on Stevenson Creek in Pinellas County, Florida, against project costs and considered the alternatives, impacts, and scope of the proposed project. In my judgment, the proposed project is a justified expenditure of Federal funds. I recommend that the Secretary of the Army approve the Section 206 Stevenson Creek Environmental Restoration Report. The total estimated cost of the project is $ 7,360,987 (of which $4,784,642 would be Federal cost according to Section 206(b) of Public Law 104-303). The remaining $2,576,345 would be non-Federal costs provided by the City of Clearwater. I further recommend that funds be allocated in the fiscal year 2003 to initiate preparation of plans and specifications. The above recommendations are made with the provision that prior to project construction, the non-Federal sponsor shall enter into a binding agreement with the Secretary of the Army or his designated representative to perform the following items highlighted in the project cooperation agreement:

a. Provide all land, easements, and rights-of-way, and suitable borrow and dredged or excavated material disposal areas, and perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the implementation, operation, and maintenance of the Project;

b. Provide all improvements required on lands, easements, and rights-of-way to enable the proper disposal of dredged or excavated material associated with the implementation, operation maintenance of the Project;

c. Provide, during implementation, any additional amounts as are necessary to make its total contribution equal to 35 percent of the project environment restoration costs;

d. For so long as the Project remains authorized, operate, maintain, repair, replace, and rehabilitate the completed Project, or functional portion of the Project, at no cost to the Federal Government, in a manner compatible with the Project's authorized purposes and in accordance with applicable Federal and State

Laws and regulations and any specific directions prescribed by the Federal Government;

e. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor, now or hereafter, owns or controls for access to the Project for the purpose of inspection, and, if necessary after failure to perform by the non-Federal sponsor for the purpose of completing, operating, maintaining, replacing, or rehabilitating the Project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall operate to relieve the non-Federal sponsor of responsibility to meet the non-Federal sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

f. Hold and save the United States free from all damages arising from the implementation, operation, maintenance repair, replacement, and rehabilitation of the Project and any Project related betterment, except for damages due to the fault or negligence of the United States or its contractors;

g. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the Project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Sections 33.20;

h. Perform, or cause to be performed, any investigations for hazardous substances as are deemed necessary to identify the existence and extent of hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the implementation, operation, and maintenance of the Project, except for any such lands, easements, or rights-of-way that are owned by the United States and administered by the Federal Government, and except for any such lands that the Federal Government determines to be subject to the navigation servitude. The Government shall perform, or cause to be performed, all investigations on lands, easements, or rights-of-way that are owned by the United States and administered by the Federal Government. For lands that the Federal Government determines to be subject to navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction

i. Assume complete financial responsibility, as between the Federal Government and the non-Federal sponsor, for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-

of-way that the Federal Government determines to be required for the implementation, operation, or maintenance of the Project Modification, except for any such lands, easements, or right-of-way owned by the United States and administrated by the Federal Government;

j. As between the Federal Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the Project for the purpose of CERCLA liability. To the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the Project in a manner that will not cause liability to arise under CERCLA;

k. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the implementation, operation, and maintenance of the Project, including those necessary for relocation, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

l. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C.2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army";

m. Provide 35 percent of that portion of total historic preservation mitigation and data recovery costs attributable to the Project that are in excess of one percent of the total amount authorized to be appropriated for the Project;

n. Under no circumstances shall the total cost of the environmental restoration, including previous study costs, exceed the legislated maximum per modification total cost of $5,000,000;

o. The sponsor, pursuant to 32 CFR Section 33.26, comply with the Single Audit Act of 1984, 31 USC Sections 7501-7507 as implemented by OMB Circular 1-133 and DOD Directive 7600.10.

The recommendations contained herein reflect information available at this time and current Departmental policies governing formulation of individual projects. Consequently, the recommendations may be modified before they are approved for implementation.

ROBERT M. CARPENTER
Colonel, Corps of Engineers
Commanding

11 REFERENCES

a. Stevenson Creek Estuary Section 206 Preliminary Restoration Plan, October 2000
b. Stevenson Creek Watershed Management Plan Draft Final Report, prepared by Parsons Engineering Science, Inc., June 2001.
c. Environmental Benefits of Stevenson Creek, prepared by Dial Cordy and Associates Inc., August 2002.
d. Stevenson Creek, City of Clearwater, Sediment Characterization and Removal Feasibility Study, prepared by BCI Engineers & Scientists, Inc., August 1998.
e. Stevenson Creek Sediment and Water Quality Study. City of Clearwater Targeted Brownfields Assessment Project, prepared by USACE, July 2001.
f. Environmental Data Report, prepared by Environmental Data Management, Inc., February 1999.

12 PROJECT SCHEDULE

The project schedule is as follows on next page.

Activity ID	Activity Name	% Complete	OD	Start	Finish	Predecessors	Office
883.1 Life Cycle Project Management		96.96%	723d	11/09/00 A	09/30/03		
1	Life Cycle Project Management	100%	223d	11/09/00 A	09/28/01 A	2	DE HL
100	Life Cycle Project Management FY02	100%	251d	10/01/01 A	09/30/02 A	1	DP-I HL, EN-G ...
122	Life Cycle Project Management thru FY03	91.24%	251d	10/01/02 A	09/30/03	100	DP-I HL
883.2 Funds Control		0%	0d	11/09/00 A	11/08/00 A		
2	Federal Funds	100%	0d	11/09/00 A	11/08/00 A		
883.3 FEASIBILITY PHASE		73.87%	949d	11/09/00 A	08/25/04		
AC124	Feasibility Phase - Actual Costs to Date - CESAJ	91.24%	251d	10/01/02 A	09/30/03*		PD-P HL, EN-G ...
883.3.1 Initial Technical Review		0%	0d	11/09/00 A	11/08/00 A		
3	PRP - MSC Approval (Receive Funds)	100%	0d	11/09/00 A	11/08/00 A	2	
883.3.2 Ecosystem Restoration Report (ERR)		72.35%	897d	01/29/01 A	08/25/04		
883.3.2.1 Engineering Appendix		100%	522d	01/29/01 A	02/28/03 A		
4	Surveys and Mapping	100%	209d	01/29/01 A	11/26/01 A	3	
5	Geotechnical Studies	100%	282d	01/15/02 A	02/28/03 A	3	EN-G HL
6	Hydrology and Hydraulic Studies	100%	194d	01/29/01 A	11/01/01 A	3	
60	Hydrology and Hydraulic Studies FY02	100%	23d	10/01/01 A	11/01/01 A	6, 6	EN-H HL
7	Engineering and Design Analysis	100%	315d	11/27/01 A	02/28/03 A	4	
883.3.2.2 Real Estate Analyses		100%	240d	01/25/02 A	01/09/03 A		
8	Real Estate Appendix	100%	241d	01/25/02 A	01/09/03 A	4	RE-A HL, RE-A ...
883.3.2.3 Environmental Studies		96.72%	671d	01/29/01 A	09/30/03		
10	Environmental Assessment (EA) / FONSI	100%	522d	01/29/01 A	02/26/03 A	3	
11	Coordination with Other Agencies	79.44%	107d	04/30/03 A	09/30/03	10	
111	Fish and Wildlife - CAR	100%	332d	10/29/01 A	02/26/03 A		
112	Cultural Resources	100%	332d	10/29/01 A	02/26/03 A	111	
883.3.2.4 Plan Formulation		96.72%	671d	01/29/01 A	09/30/03		
12	Plan Selection	100%	419d	01/29/01 A	09/25/02 A	3	
120	Plan Formulation FY02	100%	251d	10/01/01 A	09/30/02 A	12, 12	PD-E HL, PD-D ...
121	Alternative Formulation Briefing	100%	1d	04/30/03 A	04/30/03 A	12	
123	Plan Formulation FY03	91.24%	251d	10/01/02 A	09/30/03	120	PD-P HL, PD-D ...
883.3.2.5 Public Involvement		72.35%	897d	01/29/01 A	08/25/04		
13	Public Involvement	72.33%	900d	01/29/01 A	08/25/04	3	
883.3.2.6 Cost Estimates		100%	56d	10/15/02 A	01/07/03 A		
14	Cost Estimates for Alternatives	100%	57d	10/15/02 A	01/07/03 A	7	EN-C HL
15	Baseline Fully Funded Cost Estimate	100%	57d	10/15/02 A	01/07/03 A	14	

Activity ID	Activity Name	% Complete	OD	Start	Finish	Predecessors	Office
883.3.2.7 Draft Report		74.9%	251d	11/28/02 A	12/02/03		
16	Draft Report	100%	59d	11/28/02 A	02/25/03 A	15	EN-D HL, EN-G...
17	Technical Review & ITR	99.24%	131d	02/26/03 A	08/29/03	16	EN-D HL, EN-G...
18	Public Review of Draft Report	0%	42d	10/01/03	12/02/03	17	
883.3.2.8 Final Report		0%	31d	12/03/03	01/16/04		
19	Final ERR w/NEPA	0%	30d	12/03/03	01/15/04	18	
20	Submit Final Report to SAD	0%	1d	01/16/04	01/16/04	19	
883.3.3 Report and Project Approval		0%	35d	01/20/04	03/09/04		
21	MSC Commander's Public Notice	0%	5d	01/20/04	01/26/04	20	
22	SAD Report Approval	0%	30d	01/27/04	03/09/04	21	
883.4 PLANS & SPECIFICATIONS (P&S) PHASE		0%	355d	03/10/04	08/05/05		
883.4.1 Plans and Specifications (P&S)		0%	194d	03/10/04	12/15/04		
883.4.1.1 Field Investigations		0%	40d	03/10/04	05/04/04		
23	Surveys	0%	40d	03/10/04	05/04/04	22	
24	Geotechnical	0%	40d	03/10/04	05/04/04	22	EN-G HL, EN-C...
25	Value Engineering Analysis	0%	40d	03/10/04	05/04/04	22	
883.4.1.2 Plans and Specifications		0%	154d	05/05/04	12/15/04		
26	Plans & Specs (P&S)	0%	125d	05/05/04	11/01/04	24, 23, 25	EN-D HL
27	P&S In-House Review & ITR	0%	10d	11/02/04	11/16/04	26	
28	P&S BCO Certification	0%	20d	11/17/04	12/15/04	27	
883.4.2 Environmental Studies		0%	125d	03/10/04	09/02/04		
29	Water Quality Certification	0%	125d	03/10/04	09/02/04	22	PD-E HL
883.4.3 Real Estate Analyses		0%	355d	03/10/04	08/05/05		
883.4.3.1 Real Estate Acquisition		0%	125d	03/10/04	09/02/04		
30	Real Estate Federal Acquisition	0%	125d	03/10/04	09/02/04	22	
31	Real Estate Sponsor Acquisition	0%	125d	03/10/04	09/02/04	22	
883.4.3.2 Real Estate LERRD Crediting		0%	20d	07/11/05	08/05/05		
32	Real Estate LERRD Crediting	0%	20d	07/11/05	08/05/05	49	
883.4.4 Cost Estimates		0%	40d	12/16/04	02/14/05		
33	Contract Cost Estimates	0%	20d	12/16/04	01/14/05	28	
34	Project Cost Estimate (MCACES)	0%	20d	01/18/05	02/14/05	33	
883.4.5 Project Cooperation Agreement (PCA) Approval		0%	110d	03/10/04	08/12/04		
35	PCA Approved	0%	110d	03/10/04	08/12/04	22	
883.4.6 Commitment of Construction Funds		0%	45d	08/13/04	10/18/04		
36	Commitment of Construction Funds	0%	45d	08/13/04	10/18/04	35	

Activity ID	Activity Name	% Complete	OD	Start	Finish	Predecessors	Office
883.4.7	**Executed PCA**	0%	39d	10/19/04	12/15/04		
37	Sponsor Executed PCA	0%	20d	10/19/04	11/16/04	36	
38	PCA Executed by DA and Sponsor	0%	20d	11/17/04	12/15/04	37	
883.4.8	**Pre-Contract Award**	0%	41d	12/16/04	02/15/05		
39	Contract Advertised	0%	20d	12/16/04	01/14/05	38, 30, 31	
40	Bid Opening	0%	1d	02/15/05	02/15/05	39, 38, 34, 13	
883.5	**CONSTRUCTION PHASE**	0%	219d	02/16/05	12/30/05		
883.5.1	**Construction Contract**	0%	40d	02/16/05	04/13/05		
41	Contract Awarded	0%	20d	02/16/05	03/16/05	40	
42	Issue Notice to Proceed (NTP)	0%	20d	03/17/05	04/13/05	41	
883.5.2	**Engineering and Design During Construction**	0%	60d	04/14/05	07/08/05		
43	Engineering and Design During Construction	0%	60d	04/14/05	07/08/05	42	
883.5.3	**Supervision and Administration (S&A)**	0%	60d	04/14/05	07/08/05		
44	Area Office S&A	0%	60d	04/14/05	07/08/05	42	
45	District Office S&A	0%	60d	04/14/05	07/08/05	42	
46	Technical Management S&A	0%	60d	04/14/05	07/08/05	42	
883.5.4	**Construction**	0%	80d	04/14/05	08/05/05		
47	Construction Contract Physically Complete	0%	60d	04/14/05	07/08/05	42, 43, 44, 45, 46	
48	Construction Contract Fiscally Complete	0%	20d	07/11/05	08/05/05	47	
883.5.5	**Project Completion**	0%	119d	07/11/05	12/30/05		
49	Project Physically Complete	0%	0d	07/11/05	07/11/05	47	
883.5.5.1	**Project Fiscally Complete**	0%	60d	08/08/05	11/01/05		
50	USACE Audits Complete	0%	20d	08/08/05	09/02/05	32	
51	Sponsor Audits Complete	0%	20d	09/06/05	10/03/05	50	
52	Project Fiscally Complete	0%	20d	10/04/05	11/01/05	51	
883.5.5.2	**Final Closeout and Local Sponsor Assumption of ...**	0%	119d	07/11/05	12/30/05		
53	Turnover Part of Proj to Sponsor/OMRR&R Manual	0%	60d	07/11/05	10/03/05	47	
54	Cash Payment to Balance Cost Sharing Per Final Ac...	0%	20d	11/02/05	12/01/05	52, 48	
55	Final Acceptance/Transfer to Sponsor	0%	20d	12/02/05	12/30/05	53, 1, 54	